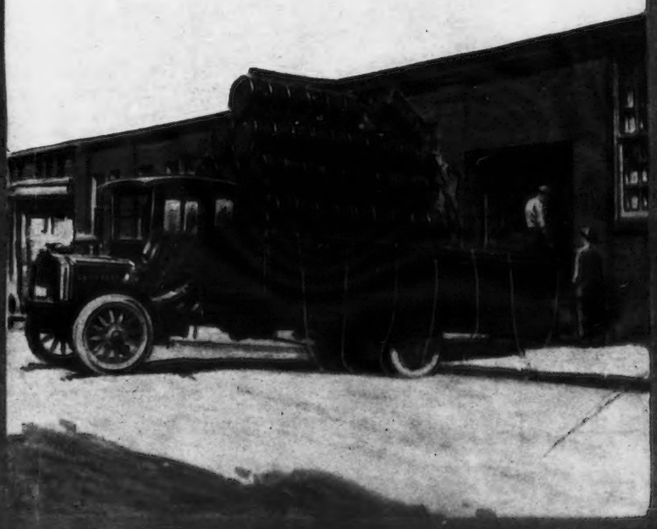
Nov 31

Oil Paint and Drug Reporter

~100 William Street~ New York ~

OCT 1 - 1920
U.S. PATENT

Chemical Exposition
1920
DRAPER STEEL DRUMS
A Necessity for Modern Shipping Efficiency



DRAPER STEEL BARRELS
FOR THE DEVELOPMENT and PROTECTION of AMERICAN CHEMICAL INDUSTRY

Volume 98 Number 15
Extra Edition SEPTEMBER 27, 1920

DRAPER

Patented June 30, 1908
Patented Jan. 12, 1915
Other Patents Pending

No. 2 Black Steel Barrel

This barrel meets requirements of the
Interstate Commerce Commission
Specifications No. 5

STEEL BARRELS

The Draper Mfg. Co.
CLEVELAND, OHIO
Cable Address: DRAPER, Western Union Code

Eastern Representatives:
C. B. PETERS CO. Inc., 15 Maiden Lane, N. Y.

DMC

CHEMICAL EXPOSITI ON—EXTRA EDITION

Oil, Paint and Drug Reporter

olume 98. No. 15 MONDAY, SEPTEMBER 27, 1920 100 WILLIAM ST., NEW YORK

OIL, PAINT and DRUG REPORTER
ESTABLISHED 1871.
The following publications are incorporated in the REPORTER:—
DRUG, PAINT AND OIL TRADE
NEW YORK DRUG BULLETIN
NEW YORK DRUGGISTS' PRICE CURRENT
AP MAKERS' JOURNAL OIL AND PAINT REVIEW
WEEKLY DRUG NEWS

Published weekly. Mailed every Saturday under publication date of the follow- Monday, by the OIL, PAINT AND DRUG REPORTER, INC., at 100 William eet, New York. William O. Allison, President; D. G. Bogert, Secretary.
SUBSCRIPTION TERMS.—For the United States, $5.00; Canada, $7.00; other for- n countries, $10.00 per annum. All remittances should be made payable to the , PAINT AND DRUG REPORTER, INC.

ADVERTISING RATES will be furnished upon application.

QUESTIONABLE OR UNDESIRABLE ADVERTISING WILL NOT BE CEPTED.

Entered as second class matter, January 15, 1884, at Postoffice, at New York, Y., under the Act of March 3, 1879.

LIBRARY OCT 1 - 1920 U.S. PATENT

THIS EXTRA EDITION OF THE OIL, PAINT AND DRUG REPORTER IS THE CHEMICAL EXPOSITION SUPPLEMENT

This section of the Oil, Paint and Drug Reporter is an added section to our issue of September 27, 1920, and is mailed to every subscriber of the Reporter without extra charge, as a link in Reporter Service. As a matter of convenience, and to bring the detailed report of the Sixth National Exposition of the Chemical Industries into separate form, it is bound apart from the regular issue.

VALE! SIXTH CHEMICAL EXPOSITION

The Sixth National Exposition of the Chemical Industries has me to an end. Its effects, though they cannot be measured, will felt by industry for some time to come. Previous expositions were ld under war influences. This year's exposition partook of the ture of a reconstruction period display. It demonstrated that the emical industry will be a dominating factor in the economic situa- n for the next decade.

During the past five years chemistry has made such wonderful ides that it is now affiliated in some manner with every industry, rge or small, in the country. Chemical science has been perfected such a degree that a person cannot eat, cannot dress, cannot get to d from business, in fact, cannot exist, without depending to a rtain extent on some of the forces of chemistry.

Following the outbreak of the war, the United States awakened the fact that it was practically helpless as regards chemical prod- s, principally dyes. We had depended on Germany for such a g time that we had done little in the nature of research and experi- ent here. It was when the war stopped the imports of dyes, chemi- ls and dyestuffs that consternation began to be felt among the coun- y's manufacturers. It was then that the American chemist stepped o the breach. Overcoming obstacles that at the start appeared insurmountable, he eliminated difficulties one by one until at the present time he has made America the leading chemical country of the world.

The exposition this year was a tribute to the accomplishments of the chemical industry and those in the industry. The symposiums concerned themselves not only with the most important problems confronting the manufacturers, but with such subjects as the economical use of raw material and the economical burning of fuel for industrial purposes. Chemists have discovered that there is a definite use for practically every bit of waste material that had in former years been thrown into the scrap heap. Even the smoke escaping from the chimneys is now reclaimed.

The exposition has afforded the layman an opportunity to learn for himself just how closely chemistry is related to his daily life. It was to enable him to better appreciate this relationship that the exposition committee made such a feature of the motion pictures this year. So far as the exhibits are concerned, the photographs reproduced in this extra edition of the Reporter convey better than words the magnificence and care with which the 460 separate exhibits were prepared.

Industry has no better or broader medium for educating the public than that afforded by an exposition such as that which closed last Saturday. Plans are already making for the next exposition, which also will be held in New York. The industry without a doubt will develop in the year to come as it has in the year that has passed. So in saying farewell to the Sixth Chemical Exposition, we are but saying welcome to the Seventh. May it portray progress to no less an extent than that of the Sixth.

ixth Chemical Exposition Surpasses All Previous Efforts

dustries Shown on a Peace-Time Basis—Symposiums Attract Chemists and Other Representatives From All Over the World—Booths Vie With One Another for Interest and Attractiveness—Value of Nation's Dyestuffs Industry Established Beyond a Doubt

If proof were needed of the importancce of the chemical industries of the tion to the public welfare, that proof was furnished in abundance at the Sixth ational Exposition of the Chemical Industries, which came to a close last turday night, after a week brimful of activity and interest. Chemistry's rela- n to practically every known line of industry was clearly demonstrated by e numerous exhibits that crowded the four floors of the Palace while the ex- sition was in session. Last year's exposition, which was held in Chicago, oke all previous records for exhibitors and attendance, but the exposition this ar far outclassed even that record-breaking exposition in every respect.

The exposition this year was divided into symposiums, each dealing with subject, or allied subjects, vital to not only the chemical industry, but to ery industry. Monday evening saw the formal opening of the exposition th talks by Dr. Herty and others, the hours during the day being devoted cleaning up and putting the finishing touches to the various booths.

In the following pages an attempt will be made to give to Reporter aders the gist of those papers read at the exposition which it is believed will of the widest general importance. Technical papers, many of which were d at the various symposiums, have been eliminated or dealt with only in ab- act where it was believed Reporter readers would not be particularly inter- ed in the subjects covered.

MONDAY EVENING SESSION

An address by Dr. Charles H. Herty, chairman of the Exposition Advisory ommittee, formally opened what proved to be the largest and best exposition the chemical industries ever held in this country. Comment heard on every de was directed to the attractiveness of the numerous displays and to the xcellence of the arrangements. Dr. Herty lost no time in indicating his attitude on the chemical industry of the United States. His convincing address should have been the means of convincing the most skeptical that here was an industry that had come to stay; but only provided that legislation was forthcoming to protect the nation's key industries, of which the chemical dyestuffs industry was the most vital.

Other speakers followed Dr. Herty on the program, among whom might be mentioned Sir George E. Foster, Canadian Minister of Trade and Commerce, and Erastus Hopkins, of Gaston, Williams & Wigmore, Inc., who delivered an informative address on the problems confronting the American exporter. Francis P. Garvan, former Alien Property Custodian, who was scheduled to speak, did not appear. Following the addresses, moving pictures were shown on the screen of the industrial city at Hopewell, Va., the ammonium nitrate plant at Mussel Shoals, and modern packing methods. The addresses of Dr. Herty and Mr. Hopkins are herewith given in detail.

Problems Confronting the American Exporter

By ERASTUS HOPKINS

When Mr. Roth extended the courtesy to me of addressing this convention upon the subject of Export as it pertains to the chemical industries of this country, a subject was propounded of such magnitude that I asked him if he would allow me to confine the talk within the limits of some few problems which seem to me absolutely vital to the extension of American trade over the broad international field of the world.

The matter must be handled in generalities, for really what pertains to the chemical industries also relates to general American trading in the problems touched on in this paper.

It is my purpose to offer some few suggestions which my experience believes to be absolutely basic and which control the success of other nations who maintain their lead in selling commodities away from their home market.

The first thought which always comes to my mind is that England, which leads the world in export, together with Germany prior to 1914, realized that they are selling goods, whereas the American exporter appears to believe that the world at large is buying goods.

Buying and Selling Principles

Of course, these are interrelated, but the principles pertaining to the two are vitally different when measured by the success of the two enterprises.

Generally speaking, the American selling organization does not study the successful methods of other countries and apply them to their own needs until such a time as they may have a better substitute. This is purely American bred-in-the-bone, as demonstrated by the reports of our various activities during the war, in which there had been certain solutions offered to us by the experience

—SCOTT—

Solvent Extraction System

SAVES Labor and Operating Costs by Eliminating Drying, Rendering, Tank Water Evaporating, Pressing, Etc. As Extractor is Charged with WET Raw Material and Delivers Finished Product DRY Ready For Sale.

Seeds, Nuts, Beans, Corn Germs, Etc., Yield **EDIBLE** Oils and Feeds when handled **SCOTT** Way

Highest yields of Oil and Grease obtained from Fish, Fish Offal, Animal Waste, Packers Tankage, Etc., Avoids Nuisance.

Scott's Also Furnish

Vacuum Evaporators and Dryers

Distilling Plant for Glycerine, Fatty Acids, Etc

Impregnating Equipment

Plant for Wood Distillation and all By-Products

Complete Plants for handling Animal Waste, Tallow, Blood, Etc.
Complete Chemical Process Machinery
Complete Equipment for Recovering from Factory Wastes viz
Pulp, Paper, Packing House, Soap Works, Etc.

ERNEST SCOTT & CO.

FALL RIVER, MASS.

of the other armies and countries, but yet not accepted as a fact of the moment previous to their betterment by the inventive American mind.

I wish you to believe that I am not in any way deprecating the American business man nor his salesman, but we might be able to enhance the value of both provided we utilize also some of the good proven points already demonstrated as successful.

In the first place, the American youth, upon whom the growth of all our foreign industries must rely, is not in any sense a colonist, nor does he ever go into a foreign field without the idea that after he has remained there a short period of time he is to return to the United States, where he is sure he can obtain a home position even if his own firm does not wish him back. As a matter of fact, his firm generally sends him out with a promise that they wish him to stay only a short time to obtain his so-called experience and then return.

English and German Methods

How different to this method is that of the English and the German. In the first place, the English youth leaves England with a knowledge that there are not thousands of positions opened to him at home, and that he is sent out to make good in a foreign field. If he returns, the question is "What is the matter, and why has he not made good?" He finds nothing at home because there is no position available. This man goes to a foreign country and grows up with it. He becomes identified with its foreign social life and domestic commercial life, and to a greater or less extent may become known in its civil life. As a person identified with the success of that foreign community, he looks about to see what that foreign community desires and has to offer for sale. He bends all his efforts to meet the requirements of that community, and thereby barters with its buying public to meet its demands.

The German, realizing the success of this English method and desiring an international trade, adopted in general the best English features, but with their thoroughness in technic and mechanical philosophical theories, sent their youths abroad as residents of a foreign community. These men might reside in a location for a matter of two years in order to learn the language and the customs. After this, this same youth would go out as a missionary among the people to whom he could talk and with whom he was identified, and talk nothing but what Germany could do to supply their wants, and yet not even up to this time attempt to sell or buy.

The ultimate result of this was naturally a confidence in the person so identifying himself with their interests, and a subsequent demand by these same people for the goods which they were to receive bearing the assurance that they were "made in Germany" because these German goods supplied their demands. We are all familiar with the stamp upon German-made goods of "Made in Germany," but we can now see that .. had a more far-reaching effect upon the world's trade than simply the wording of the phrase. It meant to the international buyer that German goods so stamped were made to satisfy their buying. It happened that these were incidentally sold by the German settled in their community.

American Methods

Generally speaking, the American manufacturer believes that he can do his own export, selling his goods in a locality which has been brought up on English and German goods and knows nothing about the American type of that commodity. He details a salesman whom he thinks is good because he has made a success of selling in the home market. This man comes to a foreign country and runs over it with his sample case, picks up a few orders, has promises of others, returns home with these orders, and then endeavors to operate that market from the New York end with a casual trip to the foreign country. Most likely this salesman will not confine himself to one country or one language, but is liable to cover the world at large. This is the general way of handling export.

The American manufacturer, instead of this method, may establish a branch office with more or less of a personnel, which is continually changed because of the homecoming of the man on the job. Only within very recent years has the American manufacturer looked into the type of personnel which should represent him abroad, and, as a consequence, his salesman very often cannot enter into the social side of the foreign colony, which really has a very large weight in the success of foreign business—more so than in this country. This is not snobbishness, and it should not call forth the sneers of the American manufacturer, but should be accepted by the manufacturer as a fact and guide him very extensively in the selection of the men whom he selects to be sent abroad. As a general thing, these men do not learn to speak the foreign language, as English is good enough for them. They do not identify themselves with the finicky little points of the community in buying, because American goods are good enough for them, and they do not identify themselves with the civil activity in that community because it is a foreign country which has not the great American political parties electing a President every four years.

The American manufacturer too often rests the success of his future business upon delegating the research to such people as write the following circular solicitation:—

"In addition to our work of observing, investigating and inquiring into commercial conditions of the various foreign countries of the world and supplying this information to different organizations in this country, we have thought that possibly we may be able to do the same work along specific lines for you." Of course, this means an expenditure of a certain amount of money to cover this anticipated missionary work. Such persons are too liable to view the general conditions of the country and make some such statement as this:—"In China there is an immense amount of white cotton goods consumed which are manufactured in England. There is an immense field for cotton goods for the United States, which is the great cotton market and manufacturing center of the world." Unfortunately, the result of this report might be the shipment of cotton goods to China, which probably would remain unsold for the reason that the American is selling cotton goods to China upon such a report, but the Chinese are buying goods only of a certain finish, and the English have adapted their finish for the Chinese market to apply to the Chinese consumption, whereas American finished goods are not of the desired finish, as this very vital fact was entirely overlooked. As an illustration of the lengths to which the English go toward catering to the special requirements of a foreign market, I might state that in connection with the sale of cotton piece goods in China, the manufacturers in Manchester cut, in some cases, an extra yard to each piece of cloth. In other words, if the piece is stamped thirty yards, the Chinese pay for thirty yards and actually receive thirty-one yards. This appeals to the Chinaman, as he is peculiarly mindful of getting something for nothing.

The Japanese imitated this English custom, but increased their free yardage to as much as five extra yards to a piece, and in this way perhaps more than for any other cause the Japanese have created a tremendous increase in their business in cotton piece goods in China.

Three Serious Problems

There are three problems which face the American exporter and have not been taken seriously enough. One is service or delivery, the other is package and the third finance.

The reason these matters have not had their proper importance is undoubtedly due to the fact that although the manufacturer views his domestic market as his own particular property for constant analysis and close competition, he has viewed the far greater field of the world as a dumping ground for goods the quality of which does not meet his home market requirements or because the domestic market cannot absorb some overproduction he has made.

We are absolutely compelled to about face in this attitude and consider the peoples of Latin-America, the Far East and Europe from the viewpoint of purchasers who have definite ideas of their own, and who will buy goods of quality properly delivered and in an accepted package.

Service

From my personal experience with firms attempting to do their own exporting, and in a firm which has for its business only the exporting of other people's goods, I have continually been impressed with the fact that goods are promised for delivery to meet certain definite requirements, and then the goods so utterly fail that the actual delivery may be absolutely suicidal to the introduction of that manufacturer's goods in that particular foreign market or in another market where the same buyer may have affiliated connections.

You will all agree with me that on the face of it this is foolish and to be condenmed, and yet there are many of you here who will acknowledge that this statement is correct.

The domestic manufacturer will ship goods according to specifications to a customer who is relatively a few miles distant and the goods not up to quality. It is a simple matter to rectify that mistake if it can be adjusted. On the other hand, see how much more vital it is to safisfy a customer in the international field, because if defective, substituted or inferior goods are shipped into that field there is incurred long delay and expense involving railroad transportation and ocean freight, together with the necessary documents pertaining to finance, certificate of origin, consular invoice, insurance, etc., and finally after six months a letter arrives stating that your customer will not accept those goods. The goods have been three months in transit, and the letter of explanation has been two or three months on its way, and you have at the other end of the line a customer who has waited at least three months for the goods and will then wait some few more months before probably receiving a denial that the goods are not what he wants. Besides, the goods are too far away for inspection, compromise or reshipment.

The other phase in regard to service which is very vital is promptness in delivery. It is even more important than it is for domestic business.

A promise is asked of the manufacturer for delivery to the railroad on a certain date. That delivery is requested because it must meet the sailings of some certain steamer, which in turn is to be met by a river boat, caravan or coolies. The manufacturer who has viewed the

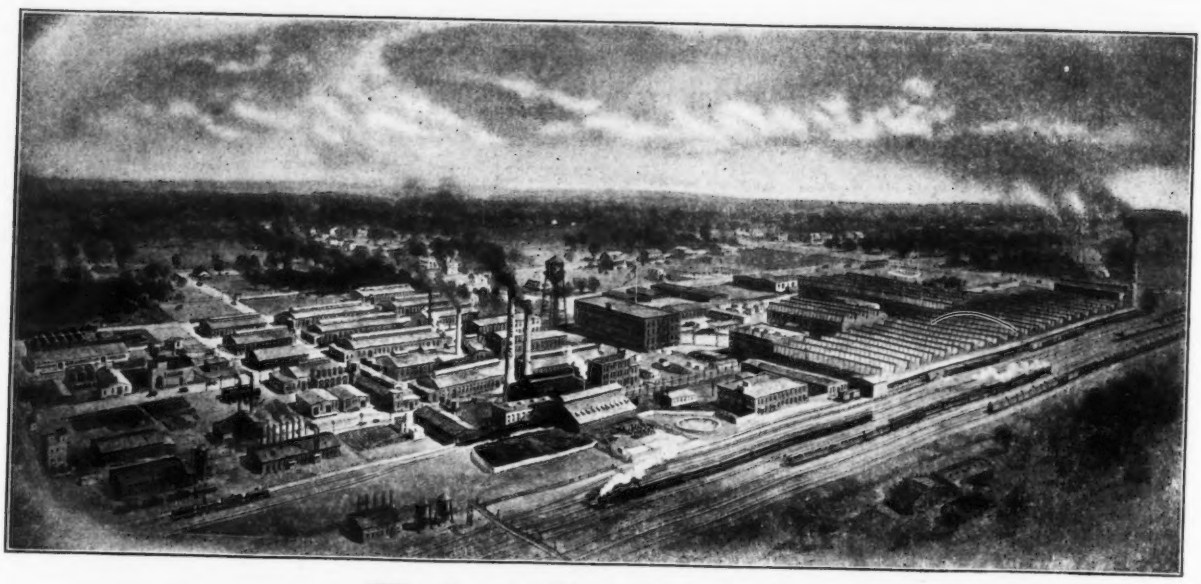
A. KLIPSTEIN & CO. BOOTH

BOOTH OF THE NEWPORT CHEMICAL WORKS

MERCK & CO.

NEW YORK

St. Louis **Montreal**



Works at Rahway, N. J.

MEDICINAL **ANALYTICAL**

Chemicals

PHOTOGRAPHIC **TECHNICAL**

international market as a side issue makes no especial effort to make the delivery, or else he sidetracks it for some friend in his domestic trade, and the customer who is waiting for these goods may be thousands of miles inland from the port on the other side of the world. Instead of looking at it from this heroic setting, the customer is a merchant at the seaboard who has a clientele thousands of miles inland. He has to meet competition of other firms, and his buyers are friendly to him. Relying upon the American manufacturer, whose goods he wishes to handle, he makes his promises and then fails because of the indifference of the American manufacturer.

Of course, you will all immediately say that the world is not perfect, and therefore the English, French and German manufacturers fail to make their deliveries, but in reply I will say that when they do fail it is not because of their indifference nor because they have a false value relative to foreign trade. Furthermore, I will assert that relative to the American manufacturer these delayed shipments are so few that comparison leaves in the mind of the inhabitant of a foreign country the impression that the American manufacturer is one who does not meet his obligations.

Packing

I do not intend to touch in the least upon the question of case packing for export, as there are definite specifications in regard to this matter, and the manufacturer who is wise will follow the same.

What I wish to speak of is this:—That the package should conform to the demands of the country into which the goods are exported.

The unit of packing if governed by the means of transportation should be very carefully noted and the goods packed accordingly. A steamer may be able to take huge heavy freight or boxed packages, but a coolie, llama or burro has an entirely different carrying power.

Another thing is the idea that the American pound or gallon is good enough. A person makes a great mistake when sending weighted goods to China who does not have the package contain a certain number of piculs, or to a country using the metric system the weight in kilograms. A great many countries have adopted the English gallon. A liquid to such countries should be put up in imperial gallons. In all cases a measure, both for volume and weight of the country, should be the one used by the American manufacturer.

Again to emphasize the lengths to which the English have gone in their endeavor to control the Chinese cotton goods market, I will mention the difference between the wrapping of bolts by the English and American manufacturer. The American manufacturer generally covers his bolt of cotton cloth with one piece of relativeiy light burlap, protecting the cotton goods inside with a couple of pieces of paper. The English manufacturer covers the bolt with an extra heavy piece of burlap, then tar paper, protecting the cloth with two pieces of heavy wrapping paper. The result of this packing is shown by the difference often seen at interior points of China. There is not a bolt of English goods which is not in perfect shape, whereas it is very frequently the case that bolts of American cotton goods arrive with broken wrappers, soiled and torn, and absolutely rejected by the purchaser.

Finance

I should like to touch for a moment upon the very important subject of finance with relation to selling goods in foreign countries.

In this connection the American manufacturer seems to feel that because sales are made beyond the coast of the United States, he has entered into an extraordinary hazard in regard to selling. Please understand that I do not refer to the risks which the manufacturer would naturally assume by selling direct to some client more or less unknown in a foreign country, but I particularly wish to refer to the main volume of his foreign business which is handled by export houses for the manufacturer.

Almost without exception, the manufacturers of this country sell to the local export houses for cash, thereby placing upon the exporter the onus of financing the goods between the manufacturer and the client in a foreign country.

All of you gentlemen are fully aware of the restricted banking and credit facilities prevailing at this time in this country, but not all of you may realize that exactly the same conditions exist today all over the world. In consequence of these conditions, export houses have to contend with greatly restricted banking facilities, which in themselves curtail operations.

The point I wish to bring out is this:—It is not fair nor is it good business for the manufacturers in this country to continue under present circumstances to demand cash from the export houses. It is essential that they share with the exporter in some manner the financial obligation, which at the present time is borne entirely by the export houses. To what extent and in what manner the manufacturer should share the financing is a matter for discussion and adjustment.

It is not at all an uncommon arrangement in England for the manufacturer and the export house to finance goods destined for a particular market on a joint account basis.

At any rate, unless the American manufacturer meets this great problem and can co-operate with the export house in regard to the financial end of its foreign business, his product will be placed at a very serious disadvantage as compared with the manufacturers of other countries maintaining a more favorable position in this regard.

Exchange Rates

At the present time the fall in sterling exchange has produced a situation which is detrimental to the American export trade as compared with that of Great Britain and its possessions. This low rate of exchange has meant to the foreign importer a higher landing cost for United States goods, and turned them to other sources of supply. This means that the American manufacturer is continually handicapped by the low rate in sterling, which operates the same as a high protective custom duty for the American manufacturer against foreign goods. It is necessary that the manufacturer meet these foreign terms with the exchange against them, especially in those countries whose basis of currency is gold.

I realize that I have taken as my example cotton goods although addressing men interested more especially in chemical industries—I have done this, as I feel that I use it as more conclusively carrying forward my points, and I believe that you will be courteous enough to accept each of these steps for an application to your several requirements.

In the attempt of the American manufacturer to obtain the international market for chemicals he is confronted with the greatest prejudice of any industry, for the German propaganda was so thorough that "Made in Germany" is a latch key. The market can be obtained if the greatest care is taken as to service in quality and delivery, weight and package. Do not substitute an American shade of a dye for the desired color when gaining the market. After you have created the interest and demand for your goods, then educate the people, if possible, to others, but you must have the personnel of its community to help you, and not a temporary bird of passage. For instance, the Far East is accustomed to a true indigo; at present they do not like to have forced upon them an R shade. The old natural indigo educated them, the German synthetic indigo catered to their prejudice. They are beginning to consider an R shade, but they really do not like it and want to continue the old shade.

After-War Problems

The sudden termination of the war brought chaos to the industrial and exporting business. During the war any manufacturer could make or deliver almost any quality goods and shipping brokers and export firms could handle all goods for acceptance with any kind of a personnel. The war ended, credits stopped, vast stores were found unsalable and are now being liquidated on any available basis for cash. A complete readjustment of the world's commercial business is in progress with the victors making every stride to outstrip their rival ally. The German trade has for the moment lost its teeth. The question is, Will the American commercial interests come to the fore by accepting its precepts proven good or will they ignore advice and example?

The American chemical industries have gained a vast advantage over others by the war and can become a big factor in the world's commerce—will they let it pass and allow Germany to recoup and reassert her position?

In selling a manufactured product a manufacturing plant establishes a sales department to handle its domestic business—this has its own traveling salesmen and the control is close and intact. The American manufacturer realizes that its selling force is independent of its manufacturing and is an overhead on its cost of manufacture, and that cost must be closely supervised by its sales manager.

Why do they not realize, as well, that a close supervision and control cannot be exercised over a sporadic foreign sales force; that they cannot get in close touch with foreign requirements and idiosyncrasies, and that they do not exercise in the foreign field the close community touch they find so essential to successfully carry out their domestic sales policy?

Foreign manufacturers have long ago realized that the cost of developing and maintaining a demand for their goods costs a big sum of overhead expense if they try to maintain their own organization, and for that reason they have gratefully utilized the advantages offered to them by their export houses whose commissions are far less than their own maintenance charges could be.

Shipping brokers and exporters of general merchandise on small business with even limited connections are of great value to the manufacturers, but I feel that you are interested in big volume business on lines large enough to receive personal attention in every trading center of the world—personally that is all that interests me.

Selling Organizations

With such a thought, why not seriously consider the great advantages to you of establishing your selling organization for the world's trading on just such a basis as you do your domestic business by obtaining this from an export house specializing on volume business?

Such a house asks of you, the manufacturer, to co-operate in meeting the peculiar conditions demanded in package and finance, and also to strictly carry out the specifications for your product and delivery.

In return a commission is paid to the export house far less than would be the independent cost to you of carrying your own international selling organization.

The American manufacturer receives from its export house every oversight in handling the product from its factory door to the foreign consumer, banking problems of exchange and collections—and what is more, an established personnel of the community, every one a linguist and identified as one of the people who are buying the goods.

What is the sense in confining one's market to one or more countries of one's fancy? Go in for volume and the world. The export house maintains for you a selling organization which meets the problems touched on in this paper, not in Chile, Brazil and South America—where every one now goes—but in Japan, Vladivostok, North and South China, Australia and New Zealand, India, North, East, South and West Africa, and all the countries of Europe.

If that export house has not a man or men qualified to handle your especial product, it will find him to your entire satisfaction, but he will be able to meet the people in their own language. That is the new policy that must be accepted and established. It will win, and I can say for one that the house having that policy firmly established gives to the American manufacturer an economical and efficient sales force which they will appreciate.

AMERICAN CYANAMID COMPANY BOOTH

Chemical Industries Need Support

By DR. CHARLES H. HERTY

Chairman Exposition Advisory Committee.

The alchemist sought in secrecy his Philosopher's Stone with which to convert base metals into gold; the iatro (drug) chemist who followed the alchemist purposely shrouded his work in mystery, thinking that thereby he could practice best his fancied wizardry. The chemist of today, however, casts aside these false standards, takes the public frankly into his confidence and applies in his daily work common sense of the most thoroughgoing quality to every problem in which his talents can benefit humanity. The outward expression of this modern policy, in which America leads the world, is this annual display of the raw materials, the machinery and the products of our chemical industries.

That the story has its popular appeal is attested not only by the thousands who thoughtfully inspect these exhibits, but by the constantly increasing space given by our press to matters chemical.

It is a matter of special interest at the present time to note the amount of space devoted to preliminary accounts of this exposition by the press of our neighbors in Central and South America. This is clearly indicative of a conviction on the part of the people of these countries that instead of looking to Germany as in the past, they must now look to America for the products of the chemical industries. This great field for export trade can be made permanently ours if we show constant good faith, attention to local desires, high quality of products and care in shipments. These are better assets than the most elaborate programmes of propaganda and subserviency to unrighteous political purposes which once permeated these markets.

Railroad Exhibits

The most striking feature of the present exposition is the reappearance of the exhibits by railroads of the natural resources along their lines. These displays locate for the chemist hitherto unknown sources of raw materials, or set forth undeveloped resources which singly or in combination under the guiding sense of the chemist can be utilized to increase the national wealth. We are recovering from the blow dealt our industrial development by the absurd policy of the recent Railroad Administration, which decreed a cessation of such exhibits. Fortunately private ownership of railroads takes a more intelligent and progressive view of this important matter. Congratulations to those progressive railroads which have reinaugurated these exhibits! Their example will no doubt be followed by many others at the next exposition.

The possibilities for development of

GENERAL CHEMICAL COMPANY
MAKERS OF STANDARD CHEMICALS

The growth of the General Chemical Company to the national institution it is today is due to the organized, collective endeavors of its technical and executive staff and to the good faith which it has consistently kept with its thousands of customers in this country and abroad. With its vast experience in the manufacture of Acids and Chemicals, the General Chemical Company is able to furnish highly standardized products which meet the most exacting specifications.

ACIDS
- Acetic
- Aqua Fortis
- Arsenic
- Battery
- Butyric
- Chlorsulphonic
- Electrolyte
- Hydrochloric
- Hydrofluoric
- Hydrofluosilicic
- Mixed
- Muriatic
- Nitric

ACIDS (Cont'd)
- Phosphoric
- Propionic
- Sulphuric
- Valeric
- White

ACETIC ANHYDRIDE

ALUM (Ammonia) U. S. P.

ALUMINUM SULPHATE

AMMONIA
- Aqua
- Bifluoride

ACETYL CHLORIDE

COPPER
- Sulphate
- Nitrate

IRON
- Nitrate
- Sulphate
- Sulphide

LEAD
- Acetate

MAGNESIUM
- Fluosilicate
- Sulphate

PHOSPHOROUS
- Pentachloride
- Oxychloride

SODIUM
- Acetate
- Bisulphate
- Bisulphite
- Carbonate
- Phosphate—Dibasic
- Phosphate—Pyro
- Phosphate—Tribasic
- Fluoride
- Hydrate
- Hyposulphite
- Silicate

SODIUM (Cont'd)
- Sulphate
- Sulphide
- Sulphite

SODIUM ALUMINUM SULPHATE

SULPHUR
- Refined
- Commercial

TIN
- Crystal-Muriate
- [illegible]
- Oxymuriate
- Nitromuriate
- Tetrachloride

ZINC SULPHATE

Baker & Adamson "B & A" Acids and Reagent Chemicals — Builders of The Herreshoff Furnace — "Orchard" Brand Insecticides
RYZON—The Perfect Baking Powder

SALES OFFICES: BALTIMORE BUFFALO CHICAGO CLEVELAND DENVER EASTON NEW YORK PHILADELPHIA PITTSBURGH PROVIDENCE SAN FRANCISCO SEATTLE
THE NICHOLS CHEMICAL COMPANY, LTD., MONTREAL CANADA

the chemical, drug and dye industries are indicated by the authorized capital of the new companies organized during the past six years. These amounts were as follows:—1915, $65,565,000; 1916, $99,244,000; 1917, $146,160,000; 1918, $73,403,000; 1919, $112,173,000; 1920, eight months, $167,992,000.

In addition to supplying domestic needs, government statistics show that during the past fiscal year our exports of chemicals have been distributed in all of the principal countries of the world. The total value of the exports was $1,250,000,000. It is of particular interest that the products of our young dye industry were shipped in quantities whose valuation totaled $24.000,000.

We must not be misled, however, by the foregoing figures. Those referring to capitalization represent authorized capital, not actual capital invested; they represent the confidence of American citizens in the great future of the American chemical industry. The magnitude of our dye exports is not indicative of a complete, self-sustained and well-rounded dye industry, but rather it is the concrete expression of the innate ability of the American to do on a large scale that which he has learned to do. Many gaps are yet to be filled before that industry is complete. We must candidly face the fact that during the past six months there has been a decided showing up in our chemical development. Their execution of many completed plans for expansion has been postponed because actual capital has been timid. Why? Because Congress adjourned without enacting into law any one of those several measures whose purpose was the protection and safeguarding of those industries which had sprung into being to fill the nation's obvious needs as affected by the exigencies of war.

Legislative Inaction

A damaging blow has been dealt by our legislative representatives through their inaction. It is not difficult to imagine the satisfaction which this situation gives to those who formerly boasted of their domination of us in matters chemical, and who now openly avow their determination to recover their lost markets. To all who have read the revelations of the base use to which that former domination was put, through corruption of our industrial life and through the establishment of a complete system of espionage which for a long time in a critical period misled public opinion and crippled our effectiveness by sabotage made easy, this prospect of a recovery of markets can be looked upon only as an impending national curse. The warding off of this peril, however, is not difficult. The case has been fully presented to the Congress, a great majority opinion, absolutely nonpartisan in its character has been developed, the House of Representatives has already acted favorably, but the Senate has failed to act. Public opinion should make itself felt—for the vital interests of the public are at stake—and insist that at the approaching winter session of the Congress this legislation be completed. If this be done, I prophesy a new era in our chemical development, which will make the successes of the past five years pale into insignificance and guarantee forever the economic independence of this country in all lines of chemical industry.

These thoughts apply particularly to our dye industry. Here much has been accomplished, progress has been phenomenal, yet much remains to be done. We cannot afford to delay the completion of this industry, for it is too intimately bound up with a vast number of our other industries and stands too closely knit with that latest development of warfare upon which our country's future safety may depend. It is a short-sighted and ill-informed American who is impatient and complains because our dye industry is not yet completely rounded out.

Of the three essential constituents of plant food, phosphorus, nitrogen and potatssium, nature has abundantly blessed us with phosphorus in the form of the great phosphate deposits of our Southeastern and Northwestern States, but our efforts to provide domestic sources of nitrogen and potassium have proved ineffectual.

Whatever mistakes may have been made in our past efforts on fixation of atmospheric nitrogen, that industry must be established. The use of nitrogenous compounds in peace as a fertilizer and in war as an explosive points clearly to the fact that we cannot afford to continue dependent for such supplies on ship transport from outside our borders. The submarine has demonstrated its ability to destroy selected ship commerce, and submarines can ply in the Pacific as well as in the Atlantic Ocean.

In potash matters we have played a losing game. In the false hope of a return to the cheap foreign potash of pre-war days, we have withheld that encouragement and stimulation of our domestic potash industry which would have assured the full development of our own resources, and now we are paying tribute to the extent of millions on millions of dollars. Where thousands of dollars have been spent on research on potash and its development, millions could have been spent whose total amount would not be a tithe of the millions we seem destined to pay as tribute, unless our policies be quickly changed.

Progress in Research

In other lines, however, the progress of industrial research has been phenomenal. Conservative estimates place the amount to be expended this year on industrial research laboratories, personnel, housing and equipment, at $25,000,000. Evidently our industries as a whole are passing out of the empirical stage and are realizing that the greatest progress is to be made through scientific development and accurate control. On the journey of the American Chemical Society to San Francisco in 1920 I was shown a new alloy which at that time had found no industrial application. Today, however, that alloy and similar ones have increased the output of our machine shops three fold, because with the same number of men and the same amount of equipment, machines can be run three times as fast. It is not difficult to understand how great a role this one development played in the rapid equipment of our armies during the war.

And this bit of history suggests the possibility of overcoming the present inefficiency of labor through research on improved methods of operation of all lines of industry. Increased production through greater utilization of chemistry is a phrase which America should take deep to heart.

In this survey of present day conditions, may I direct your attention to one anomalous situation? Alcohol is one of the most important reagents used by chemists. Congress recognized this fact in the enactment of the National Prohibition act, which, while providing for the abolition of alcohol as a beverage, nevertheless made distinct provision for stimulating the production and facilitating the distribution of tax-free alcohol as a chemcal reagent. And yet a recently enacted law in the State of New York, the very heart of chemistry in America, imposes an excise tax of 30c. per gallon on that alcohol which the Congress provided should be, from the Federal standpoint, tax-free. No other chemical reagent bears a similar tax. That law constitutes a hardship upon our industries and our universities, and it is sincerely to be hoped that the State Assembly will promptly repeal such a crippling and unjustifiable measure.

Chemical Warfare Service

Now let me make an announcement of greatest import to our country. The Congress, during its last session, in framing the Army Reorganization bill, constituted by an overwhelming vote the Chemical Warfare Service a separate and independent unit of the army, in the conviction that it could thus be developed most effectively. At its head the President has placed that brilliant soldier, Brigadier General Amos A. Fries, who led the field forces of that service with the American Expeditionary Forces. Upon invitation of General Fries, the American Chemical Society has pledged the active aid of its 15,000 civilian members in the successful development and prosecution of the work of the Chemical Warfare Service. The connecting link between that army of 15,000 silent workers in the laboratories of America and the official service in the War Department will be a committee consisting of:—

W. D. Bancroft, Department of Chemistry, Cornell University, Ithaca, N. Y.

E. P. Kohler, Department of Organic Chemistry, Harvard University, Cambridge, Mass.

A. B. Lamb, Department of Chemistry, Harvard University, Cambridge, Mass.

R. C. Tolman, Fixed Nitrogen Research Laboratory, Washington, D. C.

F. M. Dorsey, Nela Research Laboratory, Cleveland, Ohio.

W. K. Lewis, Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, Mass.

L. T. Sutherland, Sutherland Industrial Research Co., New York city.

Bradley Dewey, Dewey & Almy Chemical Co., Cambridge, Mass.

L. C. Jones, National Aniline & Chemical Co., New York city.

C. L. Reese, E. I. Du Pont de Nemours & Co., Wilmington, Del.

W. H. Walker, Division of Industrial Co-operation and Research, Massachusetts Institute of Technology, Cambridge, Mass.

Reid Hunt, Department of Pharmacology, Harvard Medical School, Boston, Mass.

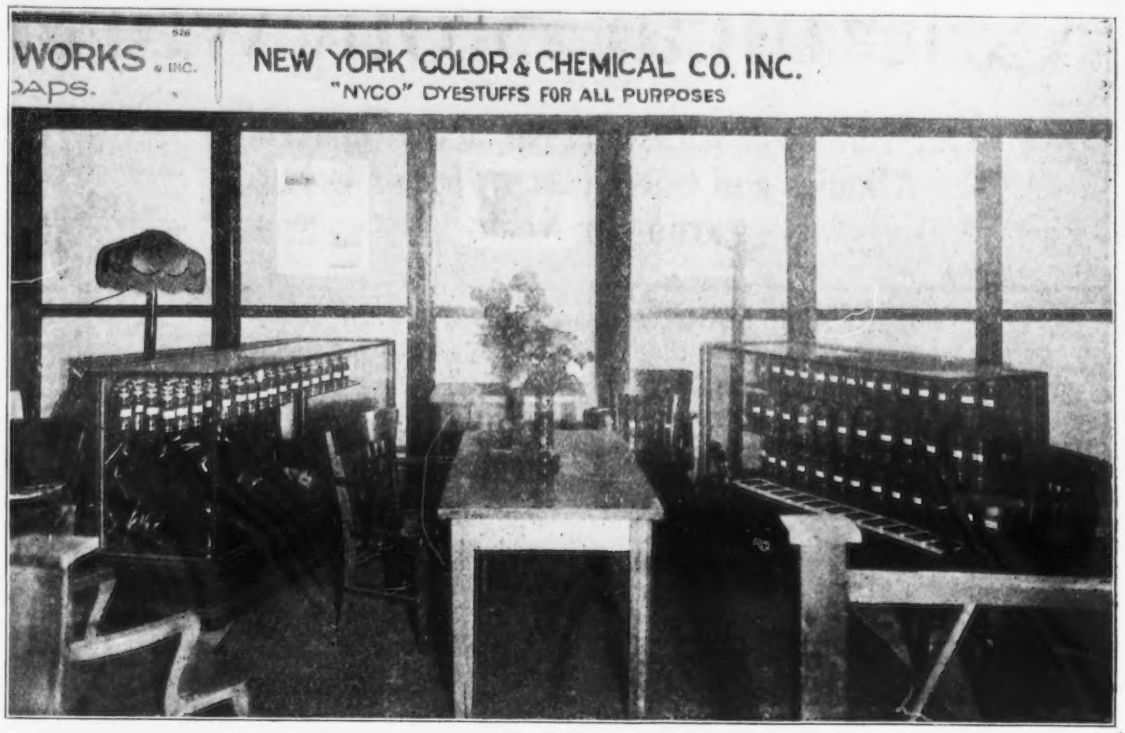
A. S. Loevenhart, Department of Pharmacology, University of Wisconsin, Madison, Wis.

Julius Stieglitz, Department of Chemistry, University of Chicago, Chicago, Ill.

Chas. H. Herty, Journal of Industrial and Engineering Chemistry, New York city.

In this list are men whose brilliant work accomplished such wonders in the manufacture of gas masks for defense and gases for the offense. The laboratories of our universities and of our industries are both represented. So too are the representatives of our dye plants included. I count it the highest honor of my life that I am to be permitted to serve my country through the chairmanship of this committee. I feel no

NEW YORK COLOR & CHEMICAL CO. BOOTH



HEYDEN CHEMICAL CO. OF AMERICA EXHIBIT

Chemical Stoneware

Made in America by Americans who know how

Our ware will withstand the action of Acids, Alkalies and Chemicals. Hot or Cold, strong or weak.

THIS TRADE MARK stamped into the body of chemical stoneware means: that it is guaranteed acid proof throughout the entire body, tough and durable and not brittle or fragile like common ware—that it is free from checks, blisters or other defects and does not leak or sweat and must be perfectly satisfactory to you.

MAURICE A. KNIGHT
ACID PROOF CHEMICAL STONEWARE
AKRON, OHIO, U.S.A.

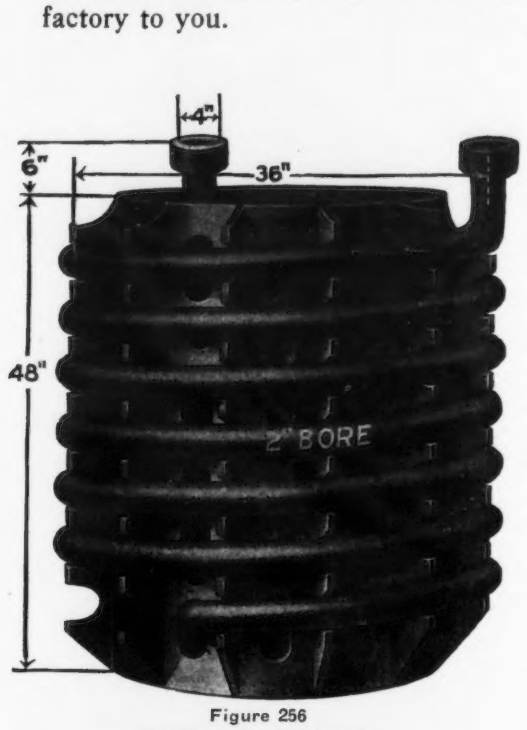


Figure 256
STANDARD NO. 4 SIZE
Top outlet and inlet coil or worm showing socket design connections. Made in either flange or socket connections.

Figure 202
STANDARD 200-GAL. STRAIGHT SIDE ACID JAR
With flanged outlet for flanged faucet. We make Acid-Proof Jars in any size or shape up to 500-gallons. Also with plain outlet for ground in faucet or plug. Also made in plain jars without outlets.

It Is The Body It= self

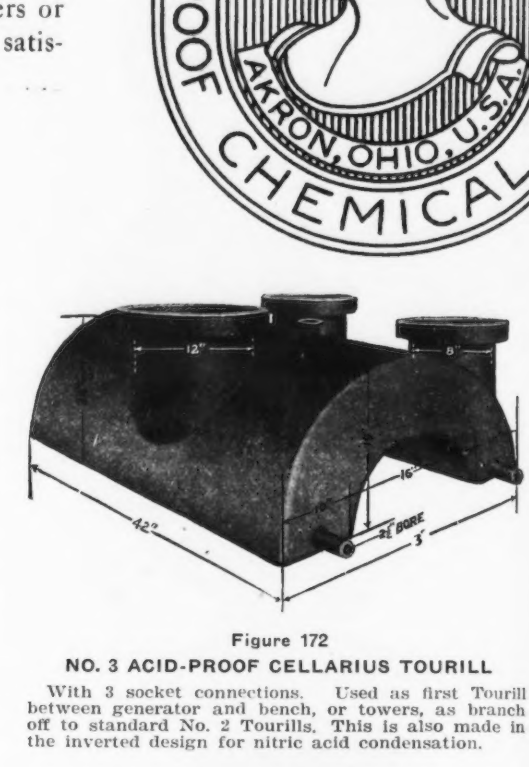


Figure 172
NO. 3 ACID-PROOF CELLARIUS TOURILL
With 3 socket connections. Used as first Tourill between generator and bench, or towers, as branch off to standard No. 2 Tourills. This is also made in the inverted design for nitric acid condensation.

Figure 290
ACID-PROOF THREADED DRIPLESS FAUCET
With apron on key to prevent possible acid spray from reaching hands or face should key become unseated.

Does this mean anything to you?

We have a six months' stock supply of coal, clay and crating material

IF YOUR DESIGN IS NOT SHOWN —SEND US YOUR PRINTS OR SKETCHES — WE CAN MAKE IT

MAURICE A. KNIGHT Office & Plant Kelley Ave. **East Akron, Ohio**

hesitation in pledging to General Fries not only the united co-operation of the chemistry personnel of the country, but also that of our industrial chemical plants.

Chemical Warfare to Stay

Chemical warfare has come to stay. The effectiveness of gas in warfare has been proved by the fact that one-third of the total hospital cases in our army were due to gas; its inhumanity has not proved itself in the light of history, for of this third our medical records show that the very great majority completely recovered, a far greater proportion than of those who were wounded by shot and shell. The fear of tuberculosis development among our gassed wounded has been proved baseless.

This happy outcome as to recovery removes in no wise the stigma which will always attach to Germany as the introducer of gas warfare. The heinousness of her offense against civilization lay in the breach of good faith in international agreement that gases would not be used in warfare. By this treacherous initiative she was enabled to destroy thousands of men of those nations who in good faith had provided no means of defense against such a means of warfare. America proposes to see to it that should her armies ever be called upon to take the field again, which God grant may never come to pass, those armies will be furnished immediately with the best means of defense which American ingenuity can in the meanwhile devise, and with an abundance of gases which will be immediately forthcoming, limited only by the resources of our land. These steps will constitute no tax upon our people in time of peace, but preparedness along this line of warfare will be thorough.

The New York Times of today discusses the subject of chemical warfare in an editorial entitled "A Chemists' War." In this editorial there are two noteworthy errors; one as to fact, the other as to national policy as I see it.

As to the question of fact, the Times states:—"It was difficult to interest Congress in the establishment of a permanent Chemical Warfare Service Bureau, to be attached to the War Department." The fact is, as the public records show, there was no difficulty in convincing Congress on this point. The difficulty lay, however, in the objections by the Secretary of War and the Chief of Staff in statements made before the Senate Committee on Military Affairs. The action of Congress in establishing the Chemical Warfare Service as a separate unit of the army was taken in spite of these objections.

As to the question of policy, the Times at the conclusion of its editorial says:—"It cannot be impressed upon civilized peoples too much that a chemists' war would be incalculably more disastrous to the nations engaged in it than the struggle of 1914-18. The American people must ask themselves whether they can afford to disregard the conviction of the 39 countries now forming the League of Nations that it offers the best safeguards against the horrors and waste of modern war."

This recalls an interesting colloquy which took place between General March and Senators Chamberlain and Sutherland in the hearings on S 2715, pages 95 and 96.

General March:—There they are, sir. That is my best thought on that subject. If the provision in the so-called League of Nations which prohibits the use of poison gas is carried out all of that will disappear.

Senator Chamberlain.—If the provisions of the League of Nations were carried out we would not need any army.

General March:—I do not see that.

Senator Chamberlain:—We are going to have peace; the millennium is going to be here. I have not any idea it will at be carried out.

Senator Sutherland:—We have already had some agreements about humane warfare, but none of them were carried out.

General March:—That is true, but this provision specifically says that the use of poison gas having been prohibited, Germany is forbidden to import into her territory any of the elements which make for poison gas or liquid gas, which is forbidden, the thought being that Germany was the only nation in the world that would start such a thing.

Senator Chamberlain:—Well, I think there are others, if they had had the chance.

The provision in the Peace Treaty by which, according to General March, "Germany is forbidden to import into her territory any of the elements which make for poison gas or liquid gas" doubtless gives to the Germans the same sense of despair that America would feel if, at the conclusion of an unsuccessful war, it were forbidden "to import" cotton for use in the manufacture of guncotton or iron ores for making steel for guns.

The Bomb Disaster

Co-operation should, however, not be confined to national affairs. Within the last few days a terrible disaster has occurred in New York city. As a result of the work of perverted minds many citizens were instantly killed and many more horribly mangled. The evidence which would determine the cause of such a disaster and trace its perpetrators is largely chemical. The time to utilize the chemist in such a situation is immediately after the disaster takes place. In the New York section of the American Chemical Society more than 2,000 chemists are numbered, among them men who are specialists in explosives, in metallurgy and in cement. No one of these men, no matter how prominent or how immersed in his own laboratory, could, as a patriotic citizen, decline an invitation to serve on a committee advisory to the city authorities in such cases of great disaster. Provided with official passes through the police lines, they could be of invaluable service through their special knowledge and acumen. For such public service they would desire no pay. There is a civic asset here which is lying neglected and which can be quickened into dynamic aid by a simple request from the municipal authorities.

Fortunately the future energies of our chemists are not to be confined to increasing the wealth of the company and providing means for its defense. There is a higher goal ahead for American chemistry:—It is the alleviation of human suffering. The normal, healthy, vigorous human being is a mass of chemical reactions which can be called normal. When these become abnormal we speak of disease, and disease entails suffering. About many of these subtle changes we know little. In our blind efforts to restore normality we try this and that drug, sometimes with success, many times with utter failure. Eminent authorities inform me that of the many synthetic medicinals sold by Germany to this country only from 3 to 5 per cent. have proved of real value. We know in general terms the results from the use of drugs, but of the fundamental reactions induced by their use we know but little. These changes in the body effected by drugs are chemical changes, but in their study in the past the chemist has played but a minor part, and we have been content to continue the "cut and try" process in our efforts to heal. It is now proposed to give the chemist the leadership in this his own line of research. But he is not qualified to work out the problem alone, for the conditions are very complex. He must be associated with the pharmacologist and the experimental biologist. With the focussing of these three types of mind upon the problems of health, under conditions of constant association and adequate experimental facilities, real progress can be made, even though slowly, in the alleviation of suffering. It is a task worthy of the best efforts of our very ablest men. Funds will be required for its prosecution. Fortunately the Chemical Foundation, Inc., which under its charter must spend all above 6 per cent. of its earnings on scientific research, sees in this direction the channel through which it can best perform its mission. It has, therefore, pledged a sufficient amount for immediate use to insure the inauguration of this work. It is confidently believed that as the work takes definite shape and progresses it will make its own appeal to those generous Americans who have never yet failed to respond to the cause of humanity when convinced that the right way to aid has been shown them.

TUESDAY

The Fuel Economy Symposium held the center of the stage on Tuesday, so far as the program was concerned, many addresses being made on the value of various kinds of equipment in effecting a saving of coal and oil fuel in these days when high prices rule and the product is scarce. Technical terms such as "b. t. u's.," "transmission," "radiation" and other expressions flew thick and fast, but it was evident from the degree of interest with which the many papers were received that the combustion engineer has cut a firm foothold for himself in the nation's industries. The keynote of the Fuel Economy Symposium was struck by R. C. Beadle, the chairman. An exceedingly interesting motion picture program followed the addresses, these showing the manufacture of sulphuric acid, the production of salt and perfumes, and how leather was being made from the skins of certain fish. Mr. Beadle's address was as follows:—

Chemical Engineer in the Nation's Industries

By R. C. BEADLE

There are probably a few activities of men that have a more gripping, a more romantic and more pertinent interest than the professions represented in this sixth annual exposition of the chemical industries of the country. In substantiation of the interest and importance of the chemical industries, we have only to direct your attention to the fact that the chemical show each year grows apace, and that it now stands first of all the shows of industry, being second only to the great world's fairs.

The chemical engineer as a practical commercial genius, which we may term him today, has only been known for a very limited time; but subconsciously, if not actually, the wizardry of chemistry has been recognized and has fascinated the people of all ages. In proof of this we have only to think back to the fanciful stories of alchemists and their attempts at transmuting the baser metals into gold. We have before us today a situation where the baser things need indeed to be transmuted into a higher form, and in speaking thus I do not wish you to take me too literally, as I speak in metaphor.

We have not a period of reconstruction after a great war so much as we have a period of entire upbuilding, the regaining of our bearings after a complete upheaval that has entirely upset the world. Great changes in conditions of labor, value of capital, and an honest struggle for an interpretation of the words freedom and license, as well as seeking after a workable definition of democracy—all these things have been so changed and altered in the last five years that we sometimes find real difficulty in getting at a true realization of values.

In past history great leaders of men have been in turn philosophers, adventurers, soldiers, jurists and merchants, but the finger of destiny seems to point today to the engineer as the "man on horseback" in this new order of things. If the chemical engineer is dealing with refinements, the perfection of processes, doing things today more simply than were done laboriously yesterday, fulfilling the demand for tremendous production, he must recognize one thing as a fundamental principle on which to build all of the solutions in which he is concerned in industry's problems, and that one factor is the great driving force behind the industries of the world—the generation and use of heat for the production of power.

In this regard it is significant to note that the chemical exposition has this year for the first time recognized the tremendous importance of all those things which go to make for better efficiency by setting aside a day of this week when matters may be discussed which relate to that brother of the chemical engineer known as the combustion engineer in its fuel economy conference, discussing carefully with eminent authorities all phases of industrial activity that relate in any way to economy in the production of that underlying force which drives the wheels of all our industries. We are faced with one of the most acute problems, both from a domestic and an industrial standpoint, that the world has ever had to meet. We are faced with a shortage of millions of tons of coal, and we can hardly pick up a newspaper without reading of some section of the country and its troubles in meeting the problem of the coal shortage.

This is a new and surprising condition for America to find itself in, and is a constant reminder of the fact that ever since America began, too little attention has been paid to the conservation of those natural resources, the very abundance and the apparent inexhaustible supply of which has cheapened them in our eyes.

Present Conditions

It seems as though nature itself, outraged by the wasteful manner in which we were abusing our wealth in this regard, has automatically brought about a condition which forces us all to think. Who would have thought ten years ago, when freight cars were lying idle on sidings by the hundreds, when men were parading the streets demanding work, that a condition could come about when labor would be so short and freight cars would be at a premium, and when the cost of transportation and labor would enter into the cost of coal to such a serious extent as it does enter in today.

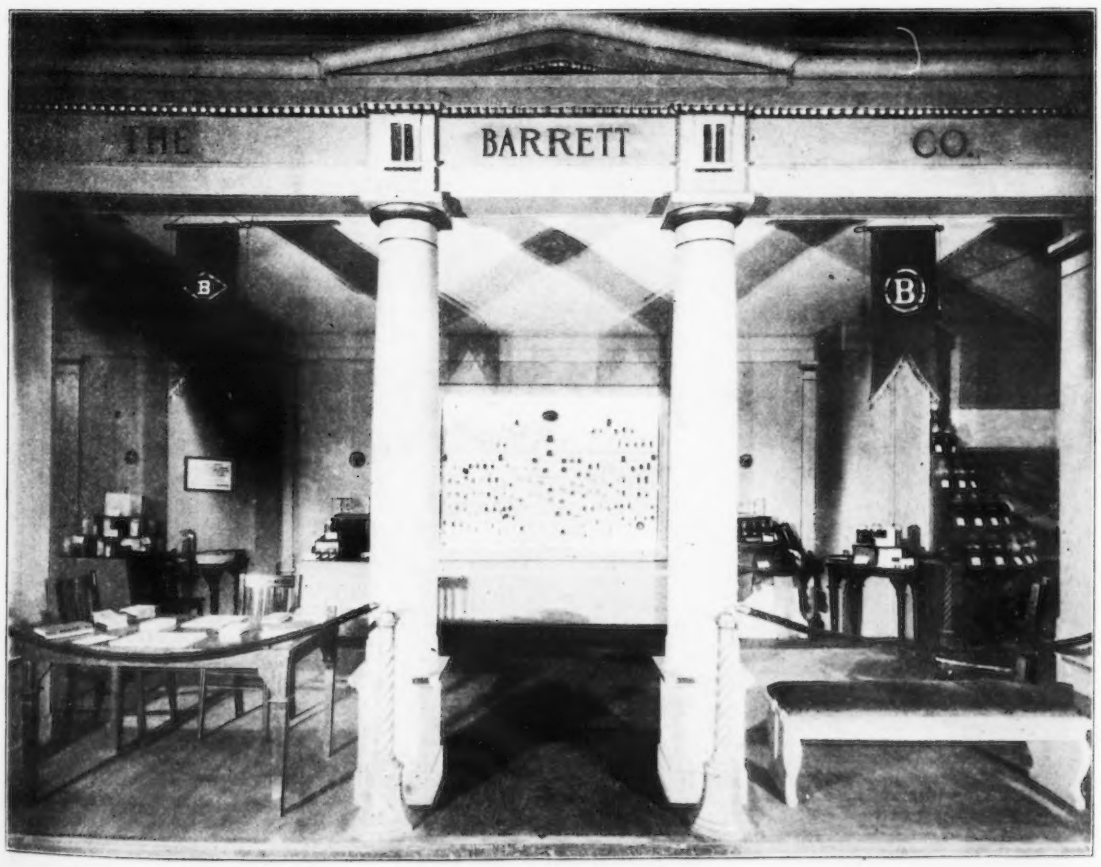
And this condition is not a local one. We find that the mines of England are slowing up on production while labor is demanding approximately a 40 per cent. increased wage; this, in addition to the increase in wages that were demanded and received during and just after the war period; that France is from twenty to thirty-six millions of tons short. We hear much of profiteering, but who can say that all are not now guilty of profiteering if profiteering does prevail? From the laborer to the distributor, straight through the line, we have the same condition of trying to get all that the traffic will bear. The interpretation of freedom and democracy to some is not measured in terms of production and service, but in inordinate thirst for power to control the machinery of production.

These things cannot be right. No condition that puts injustice and suffering on any one's shoulders or on the shoulders of any class of people can ever be right, whether that class be labor or capital or the men between, and we have had, since governments began, groups of men who have sought to make things right. The philosopher in early civilization progressed to a point and failed. The soldier came forward and claimed that all things could be adjusted by force—and he too failed. The jurist would apply the law, but the law can only be maintained so long as the people elect to obey it.

Engineer in Leading Place

The engineer is coming into his own. Today he is in the spotlight. We are watching him with breathless interest to see whether he is going to fail. We are watching him to see whether by his scientific methods of production, by his reduction of manual labor to a minimum, thereby placing a premium on education, he will not force civilization to a point

BOOTH DISPLAY OF THE BARRETT CO.



"HIPPO" PRODUCTS PROCESSES SAVE

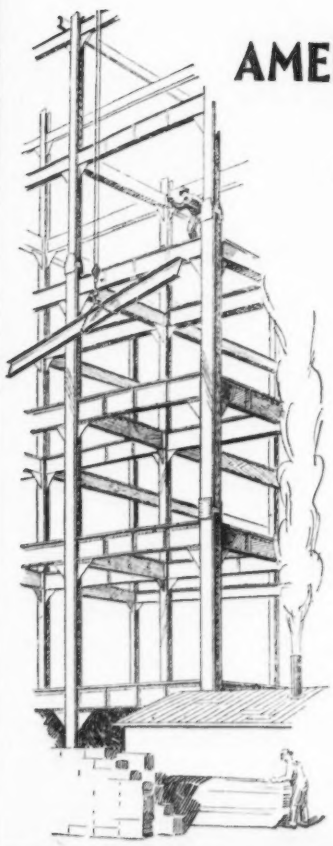
WE ARE SPECIALISTS—TAKE UP YOUR PROBLEMS WITH US

"HIPPO" Impervious Permanent Pliable Oil—A RUST PROOFER

AUTOMOBILE TREATMENT	Body Primer; Chassis Oil Black; Chassis Primer; All Air Drying or Baking
ELECTRICAL INSULATION	Transformer and Armature Impregnation and All Classes of Insulation
STRUCTURAL STEEL PROTECTION	Shop Coats and Field Coats

"HIPPO"	CL 6 No. 55	For Metal Priming
"HIPPO"	Bit-Ebonite	For Acid Resisting
"HIPPO"	Waterproof Fillers	For Fabrics and Masonry
"HIPPO"	Lacquer	For Food Tins and All Purposes
"HIPPO"	Floor Hardener	For Concrete Floors
"HIPPO"	White	For Interior and Exterior
"HIPPO"	Molding Compounds	For General Purposes
"HIPPO"	C. L. S. Wall Size	For Preventing Leaching
"HIPPO"	O. C. Oil	For Concrete Storage Tanks

Cobalt Resinate Precipitated.
Manganese Resinate Precipitated.
Bituminite.
Linoleate Concentrate Anhydrous of Lead.
Linoleate Concentrate Anhydrous of Manganese.
Linoleate Concentrate Anhydrous of Cobalt.
Linoleic Acid.



HIPPO

AMERICAN CHEMICAL & MANUFACTURING CORP.

Laboratories—Kenilworth, N. J. Mail Address, Cranford, N. J.

New York Office, 347 Madison Avenue

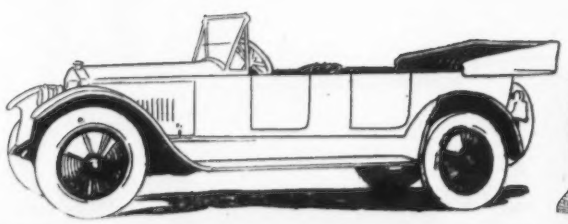
Foreign Representatives:

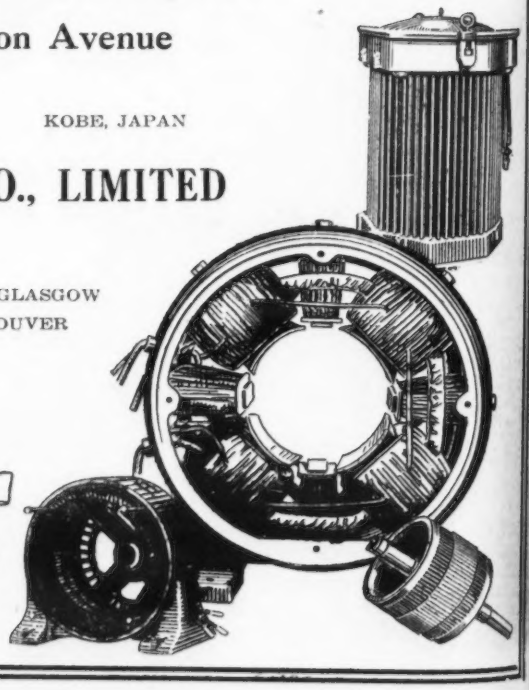
SYDNEY, AUSTRALIA KOBE, JAPAN

B. & S. H. THOMPSON & CO., LIMITED

Canadian Representatives:

MONTREAL TORONTO WINNIPEG NEW GLASGOW VANCOUVER





DISPLAY OF THE DRAPER MFG. CO.

where, through education, we are going to be able to face the future, understanding the future's problems and each other's problems, and as a wise and sagacious people make provision and meet our difficulties in a sane and businesslike way and by eliminating wastes of industry, quite as much as the needless wastes of war, solve these questions so that civilization's economic problems will fall equally on the shoulders of all. There seems to be to me just as much reason for the urge of patriotism in solving these problems by the engineer today as there was three years ago. The flag in times of peace should arouse just as much patriotism and inspire just as much love of country as in time of war.

Those of you who are here and who have in a way dedicated your lives to the great battle of eliminating waste, are each of you performing a patriotic service that is quite as valuable as the taking of a city or the preventing of an enemy from taking the city in which you live. Would it not be a splendid thing if we could think of all combustion engineers as a class aloof and apart from the mud slinging, dollar discussing campaign which is being waged by the small politicians of today, who by a trick of fate command the front page of our daily press, along with the Bolsheviki? I hope that this Fuel Economy Conference is going to be charged, not so much with the idea that there is an opportunity to present our arguments that we may get more dollars and pay dividends and increase our bank accounts, as it is going to feel that here is an opportunity for service to the country through pointing out better methods of doing the thing that was done in a cumbersome and uneconomical way yesterday, eliminating waste, and serving your country with that same splendid spirit with which you all served your country not so many months ago.

Service the Prime Essential

When we reduce achievement to its final analysis, it is not measured in dollars and cents, but in service. You who are here in this group have a wonderful opportunity to serve your country by keeping your will to serve and meet this crisis at the height of enthusiasm. The period of this tremendous crisis of the coal shortage which we are now passing is your opportunity to prove your ability to meet and solve a real situation, and relieve not only this country but the world of one of the most dangerous conditions that could be conceived. The question is up to you to decide—the viewpoint that you will take, the things that you will do, will stamp you for a generation; offer real constructive solution and your place as men and patriots and as a profession will be fixed, and there will be no reward that you can demand that will not be rendered willingly; but approach this opportunity from the standpoint of narrowness and selfishness, and for a generation you will be pointed out as the alchemists who failed.

But I know you well, and there will be no failure. New as he is, the combustion engineer loves to meet the difficult situation, and it is safe to say that you are going to conquer and reap the reward that is the victor's.

WEDNESDAY

The sessions this day were divided up into two parts, the first being a symposium on industrial management and the second a symposium on materials handling. There is no more vexing problem than that of industrial management, which concerns itself with what has come to be the uncertain element represented by labor. Experts like Harrington Emerson and H. E. Howe read valuable papers on this subject, Mr. Emerson giving the fundamental principles underlying the problem. In this section there was also read a paper by Grinnell Jones, of the United States Tariff Commission, on the progress of the American dye industry, but just why this address was assigned a place in the industrial management symposium it is difficult to see. Of the papers read at the materials handling symposium that by Everett W. Morgan on steel collapsible shipping containers in the chemical industries is of importance to Reporter readers, and it is given in full below, following the papers by Mr. Emerson and Mr. Jones.

In the evening members of the Chemical Warfare Post who were engaged in that branch of the service in the United States and abroad effected a permanent organization. Practically all the members of the new organization are connected with the dye or chemical industry, and representatives from every State in the Union crowded the conference room on the fourth floor when the meeting was called to order by Major Leslie T. Sutherland, the temporary chairman. He outlined the objects of the proposed new body and called upon Brig.-Gen. Amos A. Fries, director of the Chemical Warfare Service. General Fries declared that the last war was largely a war of gases and chemicals, and that the next war certainly would be a similar war on a greater scale. He urged that the Legion posts be made the nucleus of an organization of experienced chemists and war veterans who could serve immediately in time of need.

General Fries quoted figures upon the casualties of the war to show that the struggle was largely affected by the use of gas and said that more than 20,000 American chemists served during hostilities. Close co-operation between the Chemical Warfare Service and the organized chemists would be of great aid to the country, he said.

Major Leslie T. Sutherland was chosen commander of the post, with Lieut. Col. Mayor Smith as vice-commander. Captain E. Caldwell was designated as adjutant and Major C. Zinser treasurer. The members of the Executive Board are:—Colonel W. H. Walker, Colonel F. M. Dorsey, Colonel Bradley Dewey, Colonel R. F. Bacon, Colonel G. A. Burrell and Lieutenant Colonel W. E. Bacon.

ARTISTIC BOOTH DISPLAY OF THE DU PONTS

Super and Ultra Analysis of Costs

By HARRINGTON EMERSON

There are many books on cost keeping, but most of them fail in two respects. They are like a lump hacked from the carcass of a slain creature. Whether the creature was a bird, reptile, fish, turtle or mammal, we do not know. We therefore cannot very satisfactorily diagnose the food. Furthermore, we have not so prepared the prize as to separate skin and bone and blood and integuments from one another. Although starting with something good, we have not made a straight beginning nor have we arrived at a finished result.

Cost accounting should begin at the beginning, and it should end at the end and not grab a few undigested fragments out of the middle.

To begin with, are there any major cost accounts that are common and comparative to every collection of operations in the world? The answer is yes, but we must also say that these basic accounts are rarely or ever segregated.

Operating Elements

Every operation or group of operations is a combination of three distinct elements that should never be confused, mixed or confounded, yet they almost universally are.

One dollar is as good as another, and the two are twice as much as one dollar, but a man and a gun is not two men nor yet two guns, and we do not know what the unit amounts to until we measure and grade each separately and also in combination. A good shot with good ammunition handling a good gun may be worth a thousand times as much as a poor shot with a poor gun, loaded with inferior ammunition. Man and gun and ammunition, therefore, mean nothing to me unless I know the separate value of each and their multiplied, not added value, in combination. Both man and gun and ammunition have quality as well as quantity value, and owing to quality a little man who is a good shot, holding a little gun, may be far more dangerous than a whole regiment of recruits grouped around a defective siege piece.

The first analysis that should always be made is of the quantity and quality of the three distinct elements of man, of materials, of equipment. Our old arithmetical analysis fails here entirely. We cannot ask: If ten men and one gun and one pound of lead are used to kill one buffalo, how many buffaloes can one man and ten guns and an ounce of lead kill?

If, however, we can set up the universal cost formula of: QP, Materials; Q, quantity of units; P, price per unit; TW, Personnel; T, quantity of hours; W, rate per hour; tR, Machine or investment used; t, hours per day; R rate per hour—Costs equal QP plus TW plus tR—then we can answer any question. If it takes an ounce of ammunition from a first class gun fired by a dead shot to kill a buffalo, how many ounces will it take if the man misses every other shot that goes off and the gun misses fire half the time?

Standards in Operation

It is evident that there are standards for both quantity and for quality. For every single production or useful operation in the world there are six definite standards, namely for the six elements, Q, P, T, W, t, R.

While we may be told that some operation the production of horsepower per month for instance, has cost $8.70, subdivided to $3.000 for materials, $2.00 for labor and $3.70 for overhead, this conveys information of most tenuous value, unless we can compare it with the standard costs, aggregating perhaps $5.60. How do I know whether the high cost of materials is due to their high price, their inferior quality, or their wasteful use? How do I know whether the fireman is paid too much or does not know his job? How do I know whether the furnace and boiler are too big, too little, or out of repair? How do I know whether the high overhead is due to the small quantity of pieces produced or to the number of inefficient men or to any one of the 13 or more items that enter into overhead?

If, however, the standard costs definitely state the quantity and the quality of materials, chiefly coal, the quantity and quality of labor, the quantity and quality of the furnace, as well as of all the legitimate divisions of overhead, I can at once spot the discrepancy between actual and standard, and knowing where the leak is, I can take steps to stop it.

A further reason for using the QP, TW, tR records (an algebraical formula, not a patented device) is that they are uni-

CHAS. PFIZER & CO.

INCORPORATED

ESTABLISHED 1849

Manufacturing Chemists

NEW YORK

Citric Acid Crystals, Granulated and Powdered	99½-100 per cent.
Tartaric Acid Crystals, Granulated and Powdered	" " " "
Cream Tartar Powdered and Crystals	" " " "
Rochelle Salt Powdered and Crystals	" " " "
Borax Crystals, Granulated and Powdered	" " " "
Boric Acid Crystals, Granulated and Powdered	" " " "

Camphor Refined
Bismuth Subnitrate
Minor Bismuth Preparations
Seidlitz Mixture
Potassium Iodide, Crystals and Granulated
Iodoform
Iodine Resublimed
Chloroform
Potassium Citrate
Sodium Citrate
Tartar Emetic
Tannin

Calomel
Corrosive Sublimate
Red Precipitate
White Precipitate
Strychnine
Iron and Ammon. Cit., U. S. P.
Iron and Ammon. Cit., Green Scales
Other Scale Salts of Iron
Ferric Ammonium Oxalate
Ferric Potassium Oxalate
Ferric Sodium Oxalate
Ferric Oxalate Scales

Also a general line of Chemicals for Medicinal, Photographic, Blue Print and various Technical Purposes

versal. I may be and have been called on to compare the comparative costs of steampower, gas producers, oil engines, water power, wind power, electric power, compressed air, animal power of various kinds. Unless first aggregated into men, materials, machines, such usual subdivisions of costs as maintenance of structure, maintenance of equipment, fuel, transportation, etc., etc., serve chiefly to befog the situation.

What I want to know is the standard relative proportions of materials of wages and of investment charges for each kind of power. I do not even need to know actual amounts, percentages will do. I know a priority that in Central Africa certain materials and equipment will cost enormously but that wages are low. I know that in Pittsburgh materials and equipment are relatively cheap, but labor high. The most economical power in Pittsburgh is not the most economical in Africa and vice versa.

The big knowledge about any useful production of any kind anywhere is the standard costs per hour and the relative proportions of Q and of P; of T and of W and of t and of R.

But there is still further analysis to be made of costs. It is not enough to know the total of an item, it may be necessary to know it in several hundred subdivisions.

In a very large plant with many branches there was one summarized account called Maintenance of Shop Tools and Machinery.

I use this for illustration, because all the records both of this and other comparative plants were officially filed with the United States Government in Washington and they therefore have more than usual value as evidence, since they were not collated to prove a case or support a theory.

This account was running at the rate of $500,000 a year.

A competitor organization was running at the same rate for the same account. They started therefore neck and neck.

We first divided this account up into 12 sheets, each for one month, each sheet totalling from $20,000 to $65,000, averaging about $40,000.

SUMMARY OF REPORTS.

January	$ 65,000
February	60,000
March	55,000
April	50,000
May	40,000
June	30,000
July	20,000
August	20,000
September	25,000
October	35,000
November	45,000
December	55,000
	$500,000

This table shows at once that the four winter months occasion 42 p. c. of the work and the summer months are responsible for only 23 p. c.

There is an immediate and important hint as to when intensified supervision is most required or when the force should be kept busy on getting ready and when on keeping busy

Instead of blundering along on full pay roll in slack months with resort to overtime in crowded months, the force can be stabilized to standard numbers, standard hours and standard efficiency, the variant being the kind of work turned out. This increased intelligence of supervision and direction lowered costs not less than 10 p. c., a direct gain due to a single step in the direction of ultra analysis.

There were twenty different shops and as a second step in ultra analysis the monthly card was ruled horizontally into twenty spaces, one for each shop.

a b c d e f g h i j k l m n o p q r s t	Av'ge
1	$ 100
2	200
3	400
4	600
5	800
6	1,000
7	1,200
8	1,400
9	1,600
10	1,800
11	2,000
12	2,200
13	2,400
14	2,600
15	2,800
16	3,000
17	3,200
18	3,400
19	4,000
20	5,300
Total	$40,000

It here appears again that 5 of the shops are responsible for nearly one-half the total work, that 5 other shops cover less than 4 p. c. of the total.

It is again plain that centralized concentration of supervision on the largest shop, in the month when it is running at maximum output, will produce greater results than to scatter over 20 shops during the whole year For the same unit cost, concentrated work is at least four times as effective

But this subdivision into shops is not yet enough, it gives us no data on which to build standards. Imagine 20 missionaries in a far away place to whom clothing was to be sent, and, without enquiring whether the man is single, or has a wife and 12 children, the same assortment of clothes is sent to each! The kind of repairs going on in a shop vary as much as missionary's family.

There are repairs:—(a) to belting, (b) to abrasive wheels, (c) to hangers, (d) to motors, (e) to air pipes, (f) to steam pipes, (g) to water pipes, (h) to electric transmissions, (i) to pneumatic tools, (j) to tool holders, (k) to jigs, (l) to patterns, (m) to flasks, (n) to drills, (o) to files, etc, etc.

Altogether some twenty classes can be made as indicated by the dotted lines in figure.

The old monks used to design their own letters, and it was more or less of a disgrace to make the same letter twice in the same way, but the modern printer keeps each letter in its own division, where we can find it when wanted.

Discovering Differences

So every repair made in all the twenty shops was reported in detail of QP, of TW, of tR as to actual and standard and was filed (theoretically) in its own case. It was soon ascertained that certain classes of repairs are much more costly than others and are correspondingly more wasteful. It may be that in the big shop out of $8,000 occurring in January, $1,000 are for belting.

This is what actually happened. In the company with a yearly bill of $500,000, belting repairs alone in the largest shop aggregated $16,000 a year. By the partial time supervision of one man the repair bills were reduced to $2,500 and belting failures dropped from 12 a day to two

Each month the box reports were analyzed, the divergence from standards noted and the largest leaks were attacked, generally in such a way as to affect all items of similar kind at all the plants. If belt dope was found injurious at one shop, it was discontinued at all shops. If recut files were found inferior at one shop, they were discontinued everywhere. If grindstones were found to be slow and dirty at one place, they were replaced everywhere with modern abrasive wheels. As a consquence of special knowledge and skill, focused by the records, the costs of $500,000 per annum were gradually cut to less than $250,000, notwithstanding an increased output of 50 p c. The costs of repairs per unit of output were reduced two-thirds and in the reduced costs was included all the cost of supervision and records, all of which can be shown in official records filed with the U. S. Government at Washington.

A carpenter called upon to make a printer's case, let us say for a Russian printing establishment could not do so unless advised by the printer who knew about the letters.

Similarly no cost accountant can devise an effective and ultra analysis of costs, unless in consultation with the practical man who knows what the operations are and where it is most likely that ameliorating efforts will be effective.

It does not always pay to attack the big leak first. It may require less effort and less time to stop several easy little leaks aggregating more than the big leak.

Problem of "Burden"

It is impossible in so brief an essay to go fully either into super costs or ultra analysis. Usual costs because incorrectly segregated and inadequately analyzed are a delusion rather than a help especially in the matter of so-called burden.

Burden itself consists of as many items as our tool account did, each with its own standard QP, TW and tR, with the varying aberrations due to the inefficiencies of supply, of use, of assignment, of price, of sequence and of volume

The myriad items that enter into so-called burden are far more easily controlled in an entirely different manner.

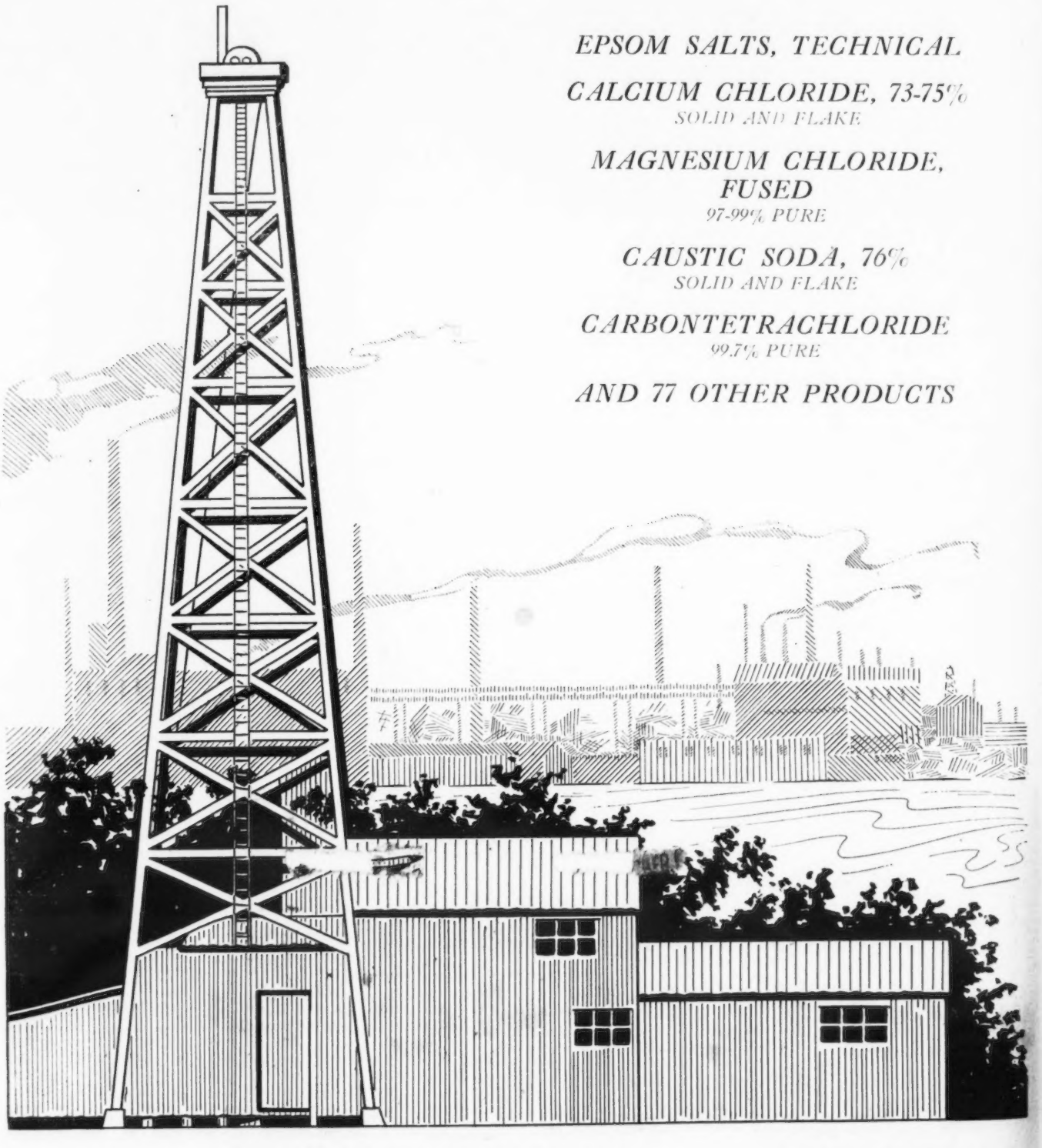
How much simpler and more rational to say to the co-ordinator (president, general manager or other supreme authority:—Your standard direct costs for each given volume and sequence is so much.

Your standard burden for each given volume and sequence is so much. In addition there are two additional burden items namely the difference between standard and actual direct costs and

THE DOW CHEMICAL COMPANY BOOTH

ROESSLER & HASSLACHER CHEMICAL CO. BOOTH

Dow Chemicals



EPSOM SALTS, TECHNICAL

CALCIUM CHLORIDE, 73-75%
SOLID AND FLAKE

MAGNESIUM CHLORIDE, FUSED
97-99% PURE

CAUSTIC SODA, 76%
SOLID AND FLAKE

CARBONTETRACHLORIDE
99.7% PURE

AND 77 OTHER PRODUCTS

The DOW CHEMICAL COMPANY

Midland, Michigan · 90 West Street, New York City

the difference between actual and standard indirect costs.

Knowing the sales market as you do, you have three duties:—

1. To sell to capacity those items as to which there is the greatest margin between standard costs and sales price.
2. To attain standard direct costs.
3. To attain standard indirect costs.

None of these can be even wisely planned for, without the assistance of super and ultra costs.

Chemical Industry Problems

I do not consider that chemical industries differ in principle from any other industry. In them also are the three elements of materials, personnel and equipment costs and after these big divisions are segregated, we are ready to begin the allotment to such operating departments as may be usual or convenient or logical or sensible, and then subdivide to ultra costs.

Probably more than in most other industries do the chemical industries set up standard costs. In one of the largest electro-chemical industries in the world we found actual costs showing wide departures from the standards, reactions taking place analogous to the condensation of steam and its re-evaporation on the way from boiler to cylinder.

The skill of the efficiency accountant must be used to record the ideals as well as the operations of the chemical engineer. Both must be guided by that common sense which concentrates effort where the largest result can be secured for the least expense in the shortest time and with the least trouble and danger.

Research in Industrial Conservation

By H. E. HOWE

I think we can agree that by industrial conservation we mean the intelligent use of our natural resources. The intelligence assumed in the formula is usually the product of research or of experience which is usually more costly in the long run than if the laws underlying the procedure had first been determined by the scientific method. The research in turn may be concerned with man or materials and by knowing the most possible about both, the industrial manager is easily able to increase economic production. The natural sciences have to do with the materials and consequently bear a direct relation to industrial conservation. There are abundant examples which can be cited to indicate the part science has played and is playing in saving time, in increasing the hours available for production, and in so controlling materials as to add greatly to the net profit.

The saving of time is an important element in the use of most of the products to be found in the Chemical Exposition. If a new filter press is put upon the market it is pretty sure to have as one of its attractive features the saving of time incident to the cleansing or changing of the filtering medium or the efficiency of its operation, which stated otherwise usually means that the materials to be filtered need not be put through the filter so slowly or so many times as with older devices. In the chemical industry the labor item is relatively high, due to the necessity of employing a larger number of specialists and highly trained men than is the case in many other lines of industrial activity. To conserve the time of such employes is important and new apparatus is constantly being designed with this in view. A classical example of how science conserves time is drawn from the experience of a certain mill in the application of modern bleaching methods, a reaction that was thought to take thirty hours for its completion was found to go forward under properly controlled temperature and pressure in forty-five seconds, so that but one-fifteenth of the capital was required to provide apparatus and stock formerly tied up in the process. A more recent instance can be drawn from the great rubber industry, where the application of organic accelerators has lessened the time for satisfactory vulcanization from two to two and a half hours to thirty minutes. There is some possibility that research on the vulcanization process may still reduce this time and what is more important vulcanize certain materials in a way to make them far more satisfactory substitutes for rubber than they have been heretofore.

Curing Processes

The subject of curing, involving as it does many complex reactions, offers many opportunities for the development of methods which will conserve time. In some instances science has not yet showed us how to accelerate curing processes and at the same time retain the qualities desired in the finished product. In many others, by the use of somewhat different temperatures and pressures, wholly satisfactory results have been obtained, and where the so-called artificial curing methods have failed to give desired results this can often be traced to a failure on the part of the operatives to properly control variables upon which success of the process depends.

The ability to work more rapidly is the equivalent of time conservation and it is well known that a machine shop equipped with modern tooled steels, which research has provided, is enabled to do three times as much work as one which relies upon the older carbon steels. This is because the new steels are capable of working at a very much higher temperature without suffering deformation of their cutting edges and these higher temperatures are reached when the machine itself is speeded up to three times its former cutting rate. The introduction of the mixing machines into the concrete industry is another direct contribution of research in mechanics and physics. A new development has recently been made in this same field whereby the advantages of time saved and efficiency achieved by present mixers may be increased while at the same time a saving of material will be effected because of the better utilization of the cement in the concrete mass. This achievement has only been possible because of research on the finished product of the older mixers, which has shown a large proportion of the cement unused and a coating of the fine and coarse aggregate with a mortar more diluted than is desirable for the best results.

In increasing the hours available for production the scientists who are studying the art of illumination deserve the highest credit. Their results have been achieved through the co-operation of engineers, chemists, physicists and metallurgists, so that today an industrial establishment may be illuminated so satisfactorily that there is practically no loss of efficiency under artificial illumination as compared with daylight and no serious inconvenience to the workers. Although the story has frequently been told, I would again remind you of the fundamental scientific research upon which our present methods of illumination are based. I would not have you forget the great difficulties overcome by the pioneers in developing methods for producing ductile Tungsten, nor the work of Langmuir on the conductivity of inert gases which in combination with the Tungsten has given us the modern type of high efficiency incandescent electric lamp. I would remind you also of what has been accomplished in duplicating the spectrum of the sun in various types of daylight lamps useful alike to industry and to science and more recently those types of carbons which duplicate sunlight so accurately that they may be used in conducting real daylight fading tests upon new dyes as they are constantly being produced.

In addition to these various appliances we must mention the work of the illuminating engineer, a specialist who is too seldom employed in applying the principles of illumination which have been established through research to the solution of our illuminating problems. One needs but to see the marked difference in appearance of the same room and settings under different types of illumination to realize in what crude fashion these details are ordinarily handled in factory as well as salesroom and home.

Unnecessary Noises

We are just coming to appreciate what is to be gained in subduing unnecessary noise and there is reason to believe that there is much that can be done in industrial conservation by the elimination of as much of the noise as possible. The tendency in this direction is occasionally shown by new devices in which sound deadening materials are employed, but it is only since the work of Sabine was begun that we have had any real basis upon which to measure the ability of various materials to insulate us from noise. At the present time these researches are going steadily forward and some interesting facts have been discovered which are somewhat at variance with the popular convention of how to construct a wall or floor, a window or a door, to transmit the minimum of sound.

The conservation of materials is an old story. You will recall that a motto of one of our successful commercial laboratories has been "science conserves resources," and this conservation is effected in many ways. I know of no more important conservation of material than that which comes from the control of processes so that seconds and inferior articles may be eliminated almost entirely. The production of seconds constitutes one of our greatest wastes for such finished articles not only represent the raw materials but also the expensive labor which has been put into their production. I remember one instance where the manufacturers of a certain type of bearing had no scientific control over their process and who frequently found 60 per cent. of the finished product to be useless. When the war brought inspectors and rigid specifications to many plants, which until that time had managed to get on in more or less haphazard fashion, many of them began to see the necessity for scientific control of materials and processes.

EXHIBIT OF INNIS, SPEIDEN & CO.

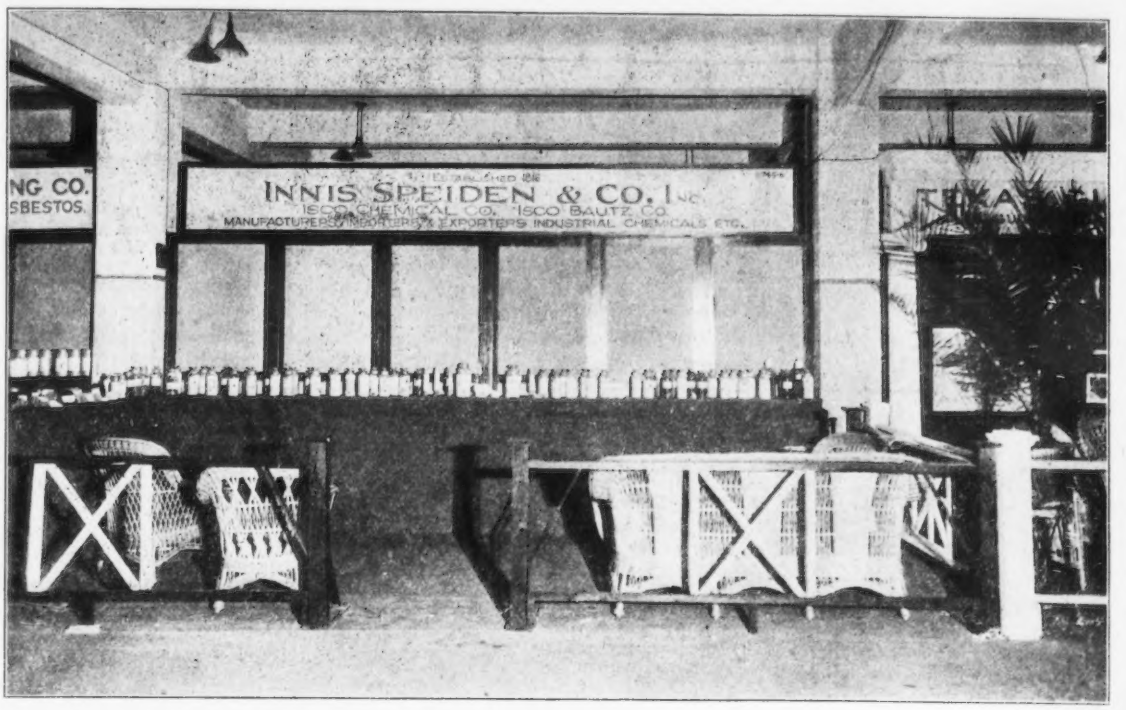
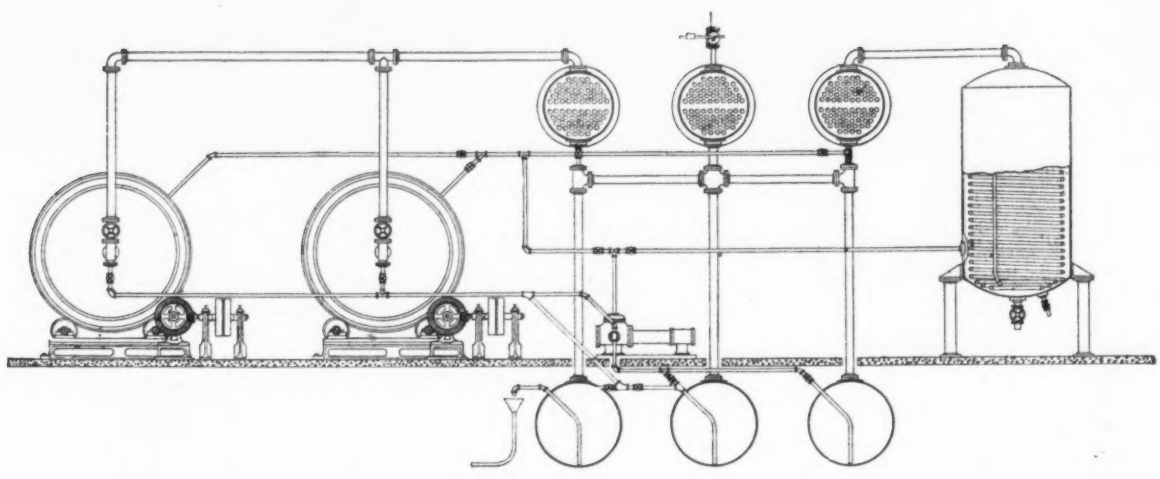

INNIS SPEIDEN & CO. INC
ISCO CHEMICAL CO. ISCO BAUTZ CO.
MANUFACTURERS-IMPORTERS & EXPORTERS INDUSTRIAL CHEMICALS ETC.
NG CO.
SBESTOS.

EXHIBIT OF THE TAKAMINE LABORATORY, INC.

Garrigue Rotary Oil Extraction Plant

(Patented)

Edible Oils *Inedible Oils*



Applicable to the Direct Extraction of

EDIBLE OIL from
- Crushed Seeds
- Oil Cakes
- Nuts, all kinds

INEDIBLE OIL from
- Animal Tankage
- Garbage
- Bones

It is built in two types
- For Coarser Materials
- For Fine Materials

The principal advantages of the Garrigue Rotary Extractor are:

1. Most complete extraction.
2. No odor of solvent remaining in extracted oil or meal.
3. Low solvent loss.
4. Small power requirement.

Garrigue Plants and Processes

For

Glycerine Recovery and Refining
Fat Splitting
Fatty Acids Distillation
Oil Recovery and Refining
Soap Manufacture

Insure the

Highest Yields
Lowest Operating Cost
Minimum Upkeep

Drawings and descriptions, with information regarding yields and costs, gladly submitted to prospective users. When writing state your requirements as to capacity and material to be treated.

William Garrigue & Company

Engineers for Oil, Fat and Glycerine Plants

154 Nassau Street, New York Works: Chicago

DISPLAY OF THE GREELEY PRODUCTS CORPORATION

There are records of steel mills which found that they were unable to make the type of billet which certain customers wanted until they had made their control more rigid. There was a manufacturer of a small case-hardened steel part who found that he could not fill his contract until he got at the scientific principles underlying the necessary process. Previous to that time he was losing as high as 70 per cent. of the finished article because it twisted out of shape during the hardening process. His comparatively small investment in science enabled him to turn out 98 per cent. of this product so satisfactory that from that time on he received practically all the orders for that particular article. Frequently manufacturers undertake the production of articles from raw materials not suited to the purpose and this continues today notwithstanding the assistance available on every hand. The producer of the raw materials, who is too infrequently consulted as to the proper methods of using his product, should always know as much as possible regarding the scientific principles underlying such uses.

There is yet much to be done in learning how to protect stores of both raw and finished products. Great headway has been made in the provision of rust preventative and proofing compounds, some of which actually remove incipient rust and can be applied without previously treating the metal surfaces. There is recorded an experience of a pulp mill where a certain fungus began to destroy great resources of pulp wood stored near at hand. It was a scientist who prescribed the application of a few gallons of sulphite liquor, which destroyed the growth and saved thousands of dollars. We still have great losses yearly in tobacco due to the lack of control over the fermentation process and the appearance of rust and rot in storing bales.

Food Diseases

Digressing for a moment, I would like to point out the great need for long-time studies upon the diseases which destroy some of our most important raw materials, namely, foodstuffs in storage and in transit. We are spending many millions annually, in an effort to increase food production, and our investment in work intended to develop methods for the proper storage and transportation of this food when produced is wholly inadequate. So long as losses of this type make it necessary for us to pay for four sweet potatoes every time two are delivered to us, and to pay for an extra shirt which we do not get every time six are bought, due to the invasion of the boll weevil and other destructive sources, the problem will remain important. The losses in other materials are often as great and the field as a whole merits the most serious attention of the American public.

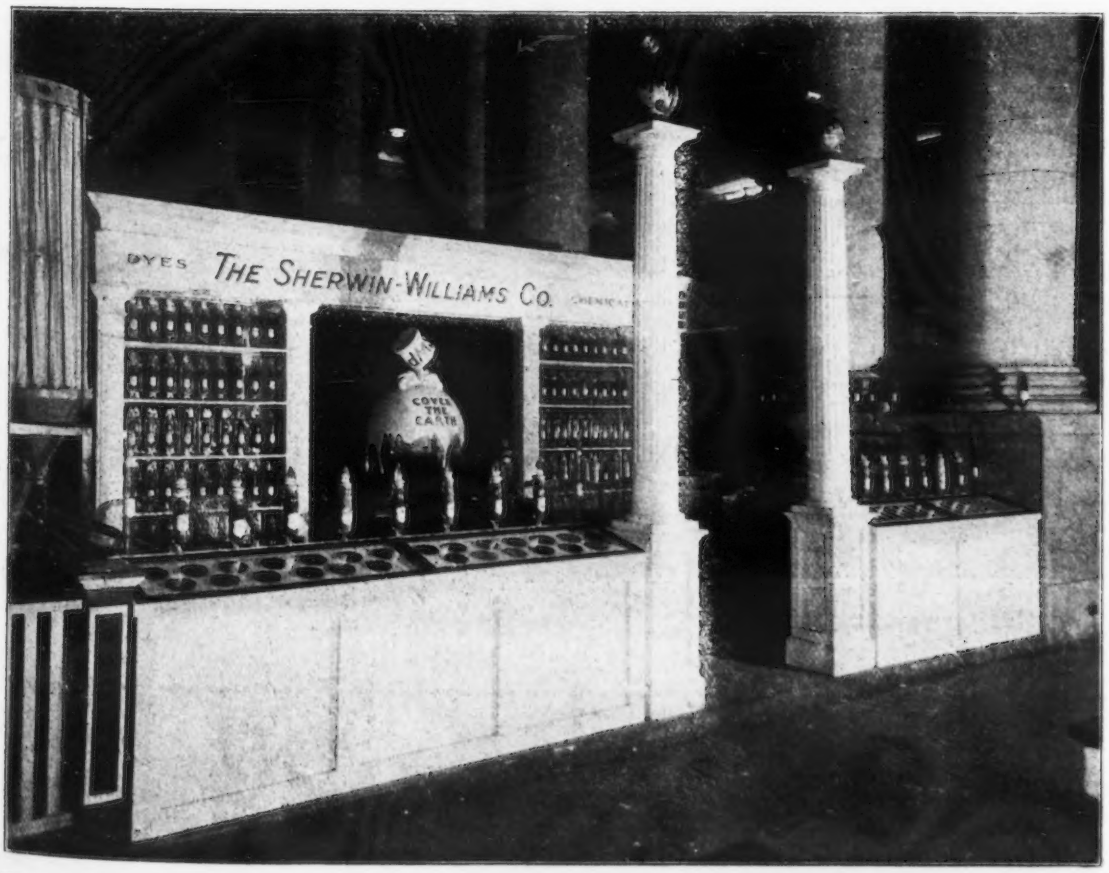
While much has been accomplished, it is apparent that there is much more yet to be done and scientists are continually endeavoring to have the public at large understand its pressing needs and to have industry avail itself of what science is now able to offer. Industry must support science in its effort to establish an increasing number of fundamental principles which can be applied to the further solution of industrial problems. There are a number of the natural sciences which have not been introduced to industry in the same way as has chemistry. Oftentimes industry is unfortunate in placing its problem before a particular science when another is better able to be of real assistance. In the past too often the sciences themselves have remained apart and have not contributed each to the other's work in as great a degree as is desirable. Wherever sciences have been cross fertilized the results have been remarkable and the achievements to be accredited to physical chemistry today is an illustration of the point I would make.

National Research Council

In the hope of bringing about some of this desirable work the National Research Council has been organized with the cooperation of the national scientific and technical societies, many unattached individual specialists, the educational institutions, and scientists in the employ of our government. The council represents the various natural sciences and endeavors to encourage scientific and industrial research in all of its many phases, including the training of increasing numbers of men who are particularly fitted to do research and to apply its results. There is one division of the council which has for its purpose the stimulation of fundamental research in industry and the persuasion of industry to support research conducted for public good. It urges the establishment of laboratories by the industries, having abundant illustration of the profit to be gained by the experience of our leading American establishments. It urges industry to co-operate upon the solution of common problems which are so fundamental and which can be pursued in common without detriment to the individual interests of the concerns cooperating. It requests support for certain projects, all of which are planned with reference to public welfare and the stimulation of research. In some cases these involve merely providing more efficient working tools for the use of the scientists, both in academic and in industrial life.

So often when such arguments as I have presented are laid before a man in the industry he assents as to their soundness and may often appear bored at a repetition of an old story, but in too many cases he remains unconvinced and feels that his own industry is so peculiar that no lessons can be drawn from the experience of others and that he is doing so well that the assistance of science is not required. It is in a change of this attitude that we are particularly interested and our effort is to change a passive agreement with our view point into an active application of the principles which we know from experience to be sound.

THE SHERWIN-WILLIAMS CO. BOOTH



Progress of the American Coal Tar Industry

By GRINNELL JONES

Chief Chemist, U. S. Tariff Commission

A year ago, the annual census of dyes and other coal-tar chemicals, prepared by the Tariff Commission, was published on June 11. This year it has been unavoidably delayed owing to the fact that it is the year in which a general census of manufactures of all kinds is being taken by the Bureau of the Census. In order to avoid having two different branches of the Government each send its questionnaire to every manufacturer, it was arranged that the collection of the reports should be undertaken by the Census Bureau, whereas the tabulation and interpretation of the reports on dyes and coal-tar chemicals would be done by the Tariff Commission. The Census Bureau, having a large staff of men covering the whole country and visiting every house and factory, has secured reports from a number of small manufacturers who were unknown to us. However, the collection of the reports has been much delayed by the co-operative arrangement, since the collection of these dye reports is from the point of view of the Census Bureau merely a small part of a vastly greater task. Even at this date the reports of over a dozen firms have not yet been turned over to the Tariff Commission, and I cannot therefore, at this time, give any final figures as I had hoped to be able to do. However, the missing reports are all believed to be of small firms making a few small specialties only. I am confident that our records are sufficiently complete to show clearly the progress made during the year, but any figures given are subject to revision upward.

The Geological Survey has recently reported that the production of by-product coke and the by-products obtained therefrom during the year 1919, shows a slight decrease, as compared with 1918. This was due to labor troubles in the steel and coal mining industries and to railroad congestion. There appears to have been a small decrease in the amount of tar distilled and a large decrease in the output of bure benzol, and especially of pure toluol. This means that a much larger proportion of the output was sold as mixtures for solvent purposes or as motor spirit instead of in the purified condition. Of more significance in considering the future of the coal-tar chemical industry is the fact that the productive capacity of the by-product coke ovens in the United States increased 17.2 per cent. during 1919. There is no question that, with the possible exception of anthracene, adequate supplies of the fundamental raw materials of coal-tar origin will be available from American sources for the growth of the industry.

Progress in Anthracene

In the case of anthracene considerable progress has been made during the past year, but the problem of securing adequate supplies is still unsolved. In 1918, the anthracene content of the crude anthracene produced was about a quarter million pounds, but very little of this was refined. In 1919 the output of crude anthracene was about three times the 1918 record, and a much larger fraction

COLGATE & CO.

Makers of CASHMERE BOUQUET SOAP

Luxurious, Lasting, Refined

The American Tobacco Co.
INCORPORATED

ALL FAMOUS

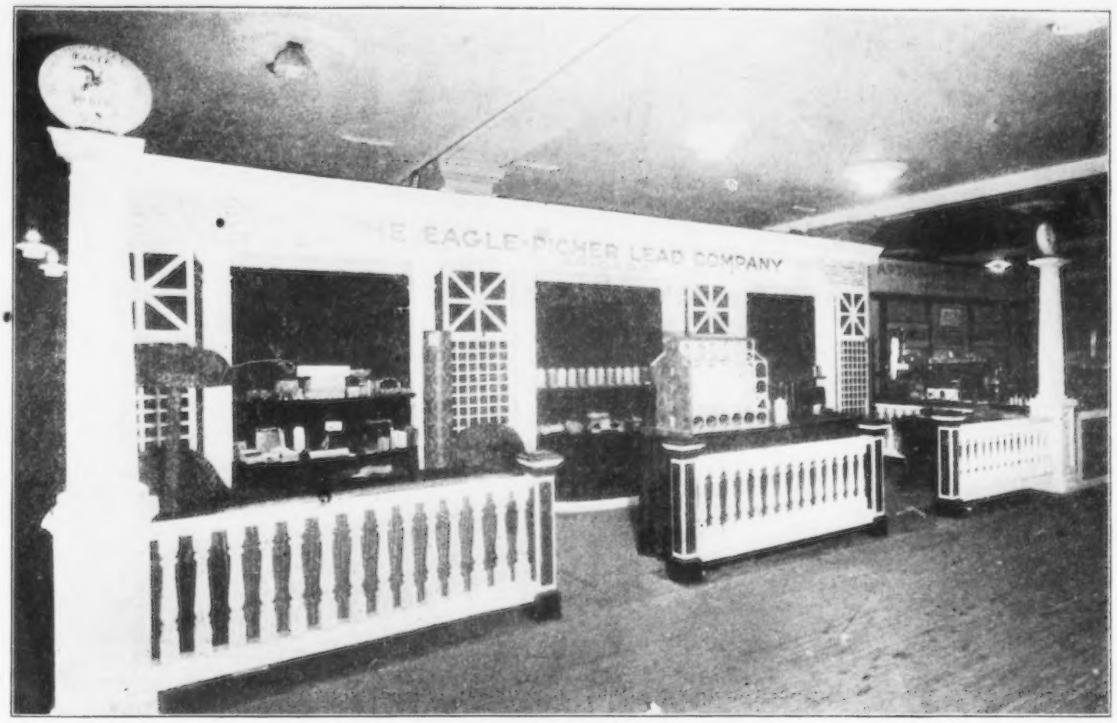
TRADE-MARKS are wonderful things. None of those shown could be purchased for millions. They are not only a protection to manufacturers, but also a still greater protection to purchasers. For, if a manufacturer permits the quality of his product to fall off in the slightest degree, the very renown of his trade-mark will be his downfall.

The fact that more than three thousand "Proctor" Dryers are giving efficient and satisfactory service in plants all over the world contributes in no small way to the stability and merit of the "Proctor" Dryer trade-mark.

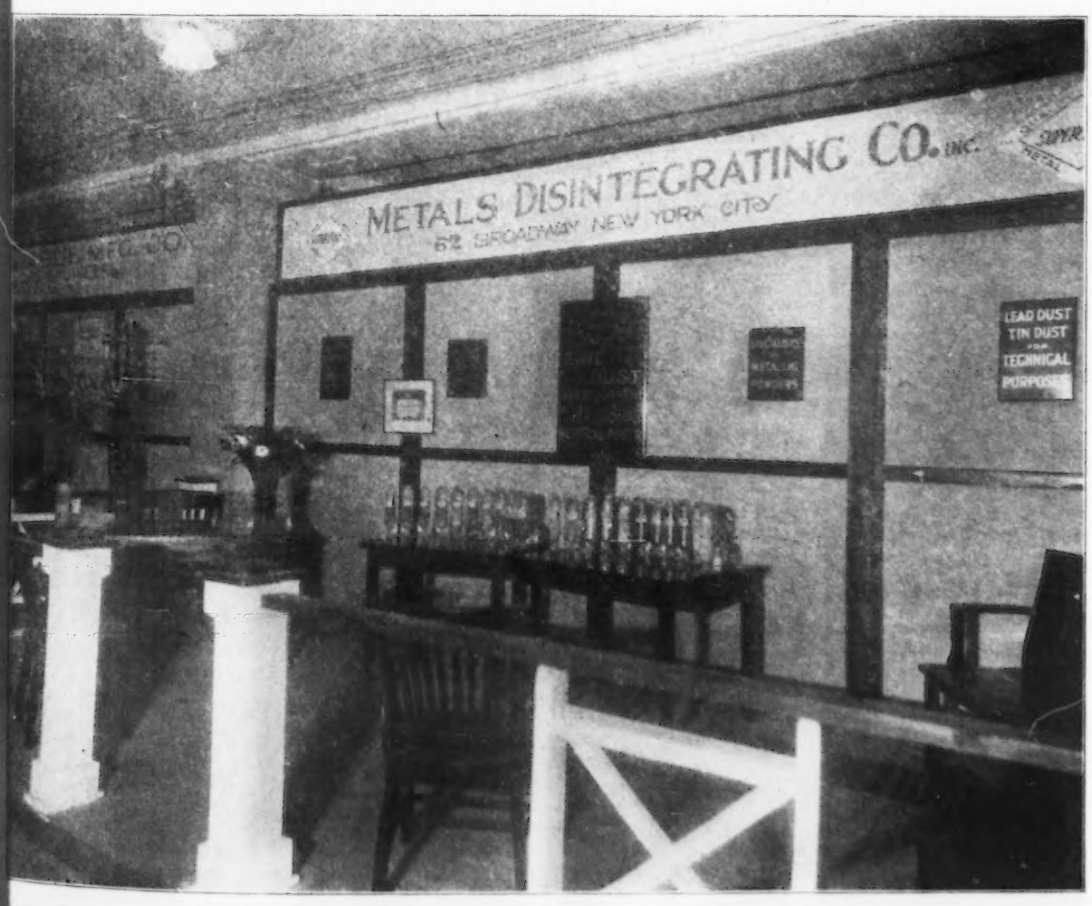
PROCTOR & SCHWARTZ, INC.
formerly
THE PHILADELPHIA TEXTILE MACHINERY COMPANY
PHILADELPHIA

"Proctor" DRYERS

THE EAGLE-PICHER LEAD COMPANY BOOTH



METALS DISINTEGRATING CO. BOOTH



if it was refined than in 1918. Although this shows great and encouraging progress, nevertheless, a much grea er increase in output must be secured before there will be enough American anthracene available to suppy the American demand for alizarin and vat dyes. It may be roughly estimated that the 1919 production of crude anthracene contained less than one-fifth of the amount of anthracene which would be required to supply the American needs. The fundamental difficulty is not primarily an actual lack of anthracene in the tar or purely technical difficulties in its recovery, but rather the fact that its removal leaves the pitch so hard that it does not find a ready market under American conditions. In England large amounts of hard pitch were used for the briquetting of coal dust and coke breeze, but this industry is very li tle developed in the United States. Any me. hod of recovering anthracene which seriously disturbs the marketability of the other larger fractions of the tar, especially the pitch, would make the anthracene so expensive that the dyes derived therefrom could not be made on a competitive basis.

This problem of securing supplies of anthracene adequate in amount and at a cost which is not prohibitive is perhaps the most important and most fundamental problem still awaiting solution in this industry. Whether it will be solved by the tar distillers or by the development of a synthetic process for making anthracene or anthraquinone cannot be determined at the present time. Active work on this problem along both lines is now under way and the progress already made is encouraging.

Decrease in Intermediates

As was to have been expected, there was a large decrease in the output of several intermediates needed primarily for explosives. This is most noticeable in the case of phenol which showed an enormous production—106,000,000 pounds—in 1918, but fell to less than one-ha f million pounds in 1919, nearly all of this being obtained from coal tar. A less conspicuous case is the decrease in the output of monochlorbenzol from 20.5 million pounds in 1918, to a little more than 4 million pounds in 1919. There was also a considerable decrease in the output of several intermediates required for making dyes used for army uniforms; for example, there was a 25 per cent decrease in the output of motolulene diamin, which was used for making a khaki dye for cotton uniforms and a 90 per cent. decrease in metanilranilin, which was used for making a khaki dye for wool uniforms. These examples mean merely that chemical skill and chemical materials were no longer needed to make explosives or other military supplies, and henceforth could be devoted to our peace industries. It is my purpose today to give some typical examples of the progress of the American coal-tar chemical industry under peace conditions.

A comparison of the intermediates produced in 1918 and 1919 shows a considerable increase in the number of intermediates and substantial increase in amount in many cases. In 1919 there were about 225 different intermediates produced, against about 140 in 1918. The new intermediates are, of course, comparatively difficult to make, but were needed for dyes and medicinals of the better class. Among these new in ermediates may be mentioned **brombenzol**, dibenzylanilin, dichloranilin, nine new sulphonic acid derivatives of naphthol or naphthylamin, betaoxynaphthoic acid, and five new anthraquinone derivatives.

As a rule, the intermediates for which there is the largest demand and whose manufacture had been well established by 1918, show comparatively litt e change in 1919. Thus, nitrobenzol gained 11 per cent., the 1919 output amounting to about 42.5 million pounds; the output of aniline was about 24.5 million pounds, a gain of 1 per cent.; paranitranilin, with an output of about 1,300,000 pounds, lost 1 per cent., and betanaphthol, with an output of about 5 million pounds, dropped 6 per cent. The output of H acid increased from a little less than 3 million pounds in 1918, to about 4 million in 1919; on the other hand, the output of dimethylanilin fell off about 15 per cent, amounting to 3.5 million pounds.

Increases in Certain Products

There are many notable increases in the output of individual intermedia'es, especially noticeable in the case of intermediates derived from toluol or from anthracene. The output of U. S. P. benzoic acid increased from about 173,000 pounds in 1918, to over 600,000 pounds in 1919, with a drop in valuation from $3.07 to 74 cents per pound. Orthotoluidin increased from 639,000 pounds to a little over a million pounds, and paratoluidin, from about 200,000 pounds to over 575,000 pounds, with a drop in valuation per pound to nearly the 1918 figures. The general increase in the output of intermediates derived from toluol is, of course, due to the relaxation of the restriction in the use of toluol during war times.

There are also many examples of a big increase in the production of intermediates which are difficult to make, but are required for dyes of the best quality. A good example of this kind is amidonaphthol sulphonic acid 2:8:6 (Gamma Acid) which was made in 1918 by a single firm, but in 1919 by five firms, with an output of over 155,000 pounds valued at $667,600, which is many times the 1918 output. Those five firms used this gamma acid to make nearly a half million pounds of Oxamine Black—an important direct black which can be developed. Moreover, Gamma Acid also went into Diamine Fast Red F, Neutral Gray G, and Columbia Black F. B.—all of them important direct cotton dyes of faster type.

Other intermediates, whose output increased substantially, include metanilic acid with an output during 1919 of 450,000 pounds; ethylbenzylanilin, which served for the manufacture of acid violet; Michlers ketone, 280,000 pounds; used mainly for the important dye Auramine; thiocarbanilid, 2,250,000 pounds, used as an accelerator for vulcanizing rubber; naphthylamin sulphonic acid 1:5 and 1:8; and amidonaphthol sulphonic 1:2:4 (about 900,000 pounds) important naphthalene derivatives.

The progress among the anthracene derivatives is of especial interest. Here, unfortunately, definite figures cannot be given without revealing confidential information. In 1919, there were ten intermediates derived from anthracene against only five in 1918. The output of anthraquinone, which is the most important because it serves as raw material for the manufacture of nearly all other intermediates derived from anthracene, was about ten times as great in 1919 as in 1918.

Total Output of Dyes

The total output of all dyes increased about 8 per cent. over 1918, or to a little more than 63,000,000 pounds valued at about $67,000,000. The average value per pound was $1.07, which is just the same as shown by the 1918 Census. The average quality of the dyes, has, however, improved considerably, due to a partial replacement of many of the cheaper dyes by others of a more salt factory character. The consumer, accordingly, received better value for his money in 1919 than in 1918.

The production of basic dyes for 1919 was over 4 million pounds, an increase of more than a million pounds as compared with 1918. The production of Magenta, Victoria Blue, Malachite Green and Bismarck Brown, more than doubled, while Auramine nearly trebled. There has been a conspicuous increase in the production of Rhodamine B.

The production of direct dyes was about 14.5 million pounds, an increase of 2 million pounds as compared with 1918. About half of this total was Direct Deep Black E. W. Conspicuous changes include large increases in the output of Chrysophenine, Benzoline, Oxamine Black, Diamine Red and the first appearance of Diamine Fast Red F.

The production of mordant dyes during 1919 was over 2,100,000 pounds which is about 2,300,000 pounds less than the output of mordant dyes in 1918. This decrease is due principally to a diminished production of alizarin yellow G, G1 and R, of more than 2 million pounds. Mordant dyes available in 1919 in considerable although inadequate amounts included alizarin, alizarin sapphirole and other alizarin derivatives, as well as a considerable number of fast mordant dyes for wool dyeing and mordant printing.

The production of acid dyes for 1919 was over 14 million pounds, an increase of about 6 million pounds over 1918.

Indigo Output Increases

The production of indigo, 73 per cent. paste, reached 8,863,824 pounds valued at $5,233,719. This exceeded the 1914 importation by 356,185 pounds, and the 1918 production by 5,779,926 pounds. Several indigo derivatives were placed on the market. Four other vat dyes were made on a commercial scale during 1919 but the output was only a small fraction of the prewar consumption. However, fundamental progress has been made in this important field.

The total production of sulphur colors for 1919 was over 17 million pounds. This

ESTABLISHED 1875

CHAS. F. GARRIGUES CO.

54 WALL STREET
NEW YORK

CHICAGO:
10 SO. LA SALLE ST.

SAN FRANCISCO:
2 PINE STREET

BROKERS

Chemicals *Acids* *Oils* *Waxes*

for the following industries

Explosive *Soap* *Textile*

Leather *Paper* *Dye* *Fertilizer*

Wood Flour *Quicksilver* *Steel Drums* *Fullers Earth*

Sole Selling Agents for the

Norwegian Nitrogen Products Co., Inc.

Direct Importers and Distributors of the Products of the

Norsk Hydro-Electrisk Kvaelstofaktieselskab

KRISTIANIA, NORWAY

Nitrite of Soda 96-98% *Nitrate of Ammonia* *Nitrate of Lime*

Sole Selling Agents or Distributors for

NORWEGIAN NITROGEN PRODUCTS CO., Inc.
54 WALL STREET, NEW YORK

SAWYER TANNING COMPANY
NAPA, CALIFORNIA

CARSON QUICKSILVER MINING COMPANY
WILMINGTON, DEL.

HORACE J. HOLLEY & COMPANY
SEATTLE, WASHINGTON

VIRGINIA SMELTING COMPANY
BOSTON, MASS.

WELDED STEEL BARREL CORP.
DETROIT, MICH.

ESTABLISHED 1917

GARRIGUES INDUSTRIAL PRODUCTS CORPORATION

IMPORTERS :: EXPORTERS
AND
MANUFACTURERS' AGENTS

was about 6 million pounds less than 1918. This was largely due to a decrease of about 8 million pounds of sulphur olive and khaki dyes required in the war period for cotton uniform cloths. Sulphur black production in 1919 (14,250,000 pounds) was about 2 million pounds more than that for 1918.

Among the coal-tar medicinals there has been a substantial increase in the output of many items already well established in 1918, including aspirin, acetphenetidin, arsphenamine, guiacol, and methyl salicylate. Moreover, a considerable number of new products have been introduced on a small scale.

In the case of photographic developers of coal-tar origin, there was a decrease of 20 per cent. in the output of hydroquinone—to about 200,000 pounds valued at nearly half a million dollars. On the other hand, the output of metol increased more than five times—to nearly 60,000 pounds, and para-amidophenol increased about 7 per cent.—or to over 130,000 pounds.

The many difficult problems in readjustment from war conditions to peace conditions have been met with encouraging success. The achievements of American chemists in these industries furnish an excellent basis for optimism as to the future.

HERCULES POWDER CO. BOOTH

Steel Collapsible Shipping Containers in the Chemical Industry

By EVERETT W. MORGAN

My prime motive in coming to you today is to focus your attention on one phase of a subject about which we do a great deal of talking but very little acting. The word conservation has a very broad meaning—its terms are so general that we all believe in it wholeheartedly, but when it comes to doing we leave it to the other fellow. The American temperament does not readily bend itself just at present to the idea. We get impatient if some one tells us to cut out the waste, but every one of us can tell them how he can do it.

I want to confine myself to particulars for just ten minutes. I want to show you how from $500,000,000 to $800,000,000 are wasted annually in the United States, how this affects you as an industry and as individuals, and how you can do your part to offset it.

To do this I must first show you this metal container. Please consider that I am demonstrating a principle to you, rather than that I am presenting a commercial proposition. While I am associated with those who have developed this container, I am not here to sell anything, except, possibly, the idea that a remedy has been found that can go a long way toward a real cure.

Early Container History

In Boston there is a man, W. H. Noble, treasurer of the Pneumatic Scale Corporation, who is engaged in the manufacture of machines which fill and seal paper cartons with innumerable commodities. Some ten years ago he discovered those cartons did not always move safely and he began studying the question of how they could be moved more safely, and therefore be more extensively used, and he conceived the idea of this shipping container. Having designed and built it, after consulting the best engineering talent he could procure, he showed the container to shippers and to railroad men, all of whom commended it and declared it was a most excellent shipping container.

This box is made of six panels of metal, each about an eighth of an inch thick, the panels are made of three sheets of metal, the center sheet being corrugated and attached to the other two sheets by a fusing process. There is a frame running around each of these panels, which are attached at the edges by means of long hinges which run the full height of the box, and along the length of the box, the bottom and the top are attached. It is hinged so that the top and the bottom can be opened through the long hinge. To lock the top and bottom keys are driven in, the shiny tops of which are visible. To open the box, the tops of the keys are broken off, so that a glance at either end will indicate whether or not any pilfering has occurred. The box is approximately of the same weight as the substantial wooden container which we were all using a few years ago, but is many times stronger, it knocks down by taking out the key, and in this shape weighs about 70 pounds per cubic foot, and is about three-quarters of an inch thick.

When in use the owner of the box will be the shipper, whose name will be stenciled on it. It also will have on it a serial number and its weight. The box comes back to the shipper in a knocked down shape, as he is the only one who has a key to fit it and the only one who can prepare it for shipment again.

Report on Container

A committee of the American Railway Association, after examining the box, reported as follows:—"It is many times stronger than a wooden box, and practically indestructible in the ordinary wear and tear of freight handlings. By the use of an automatic lock the case cannot be opened without clear evidence of robbery. Therefore the advantages, as we see them, are as follows:—(1) Prevents concealed loss. (2) On account of construction, prevents damage, also concealed damage. (3) Does not absorb moisture, as a wooden or fiber container would. (4) Can be used over and over again indefinitely." Now enough for the box at present. The Underwood resolution before the Senate last spring, on the newsprint situation, made the following statement:—

"The pulp and paper industry of the United States consumed in 1919 5,500,000 cords of pulpwood, of which 1,000,000 came from the freehold lands of the Canadian provinces. During the same year there was used in the manufacture of wooden and packing cases and containers 6,000,000 feet of various kinds of woods. It can safely be assumed that one-half of this was soft wood, capable of making pulp, 3,000,000 feet of lumber are equivalent to 6,000,000,000 cords of wood. As it takes about one and one half cords of wood to make a ton of paper, it is, therefore, plain that the wooden packing cases and containers made of soft wood consumed enough material to manufacture 4,000,000 tons of paper, or in round numbers, double the quantity manufactured by all the newsprint mills of Canada and the United States combined, the newsprint manufacturers of the United States using, in round numbers, 2,000,000 cords of wood for the 1,375,000 tons of paper produced.

And this resolution does not tell the worst feature of the situation. Practically all of this wood used in the manufacture of packing cases and containers was destroyed after being of service for but one trip. Except for a single service, this wood and the labor employed in its preparation were absolutely wasted.

Question of Wood Waste

Aside from the big economic question involved, in which all good Americans should be interested, this question of a waste of wood has a direct bearing on the chemical industry. You know just how much your interests are allied with the manufacture of wood pulp, and to what extent chemicals are used in making wooden boxes. If the waste of wood used for boxes can be eliminated, according to the figures of the Underwood resolution, a field will be opened for the sale of just three times the amount of chemical products for the manufacture of wood pulp as was used in this work in 1919.

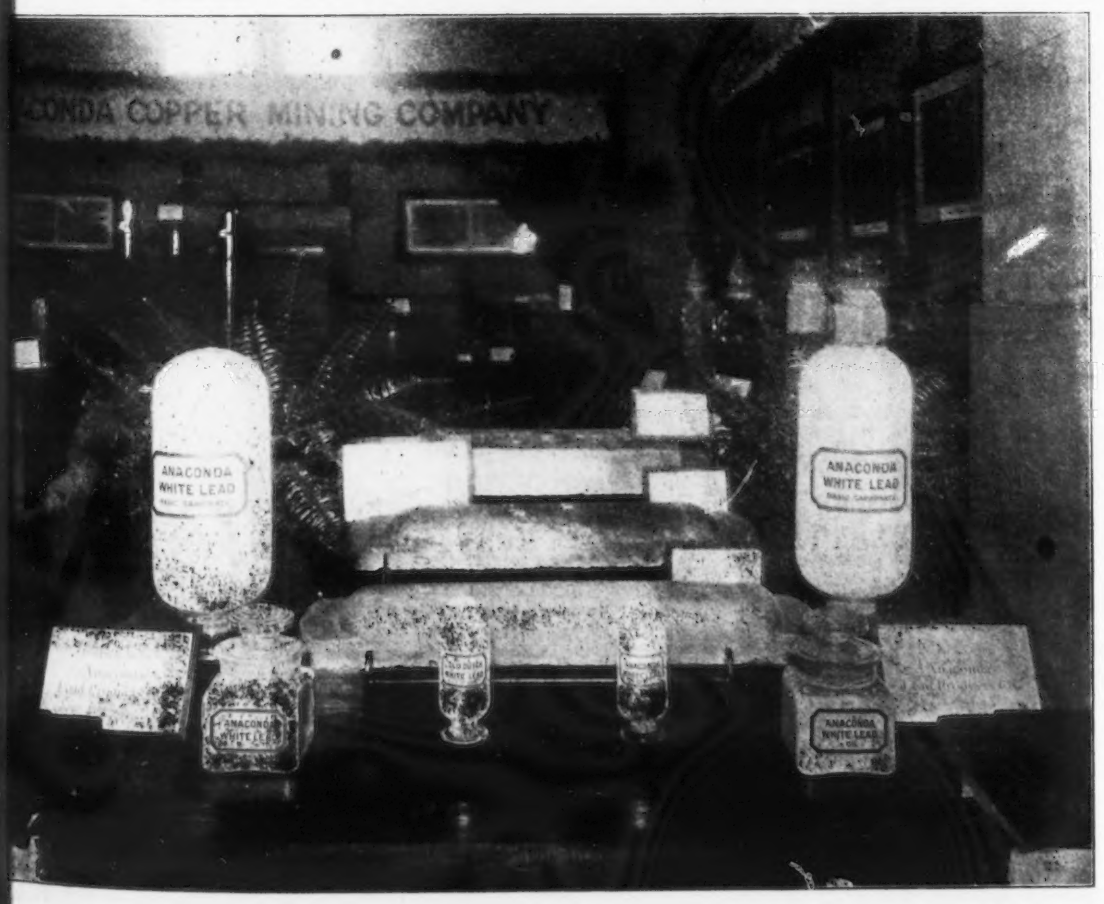
The chemical industry was one of the first to utilize a metal container for shipments, such as carboys and drums. Those containers are radically different than this one, necessarily so, but the only reason you did not use any others was that none other suitable to your need developed. You can readily see, however, that there are great numbers of your products for which this would be ideal. It cannot be tampered with, it protects the original packing and it does not absorb moisture.

I just want to touch on the subject of how this movement will affect you as individuals. During 1919 the country's railroads paid to shippers $104,000,000 in loss and damage claims. The railroads paid this tremendous bill, but who ultimately pays for it. You and I. More than $25,000,000 worth of eggs were destroyed in transit. Not only do you and I get fewer eggs as a result, but we pay our share of this loss every time we buy an egg. Let me read ffrom the Sun and New York Herald of last May 16:—

"Few persons considering the cost of living realize that more than $700,000,000 is added to the cost of their food, clothing and other necessities each year because of the waste caused by damage, unscientific loading and the tremendous cost of packing these commodities. These are some of the items which enter into this waste etimate:—Damage and theft, $100,000,000; wasted lumber used only once in packing cases, $240,000,000; empty carspace, $209,000,000, and the staggering cost to the railroads of hauling half empty cars more than 5,000,000,000 miles, $157,000,000. It is estimated that from 10 to 25 per cent. of the cost of foodstuffs goes to pay for the crates that are thrown away.

"Various remedies have been suggested to offset this loss which so directly affects the consumer. The most obvious way, suggested by many of the leading

ANACONDA COPPER MINING COMPANY BOOTH



NATIONAL U.S.A. COLORS

A NEW national spirit is arising from the ashes of the great war. Americans are beginning to think internationally, and to emerge from the provincialism which was inseparable from the first century's growth of the Republic.

¶ A pride in American quality is taking the place of a parochial indifference to foreign opinion of the things we create. American quality is built up on the triple foundation stones of American capital, American labor and American material.

¶ A new significance is thus given to the term **"NATIONAL DYES,"** which means that the wide line of dyes made by the **NATIONAL ANILINE & CHEMICAL COMPANY,** Inc., are, type for type, the equal of, and in some cases superior to, any foreign dyes which have been offered in times past on the American market. **STRENGTH, BRILLIANCE** and **PERMANENCE** are the characteristics of the colors produced by **NATIONAL DYES** on American goods, and are the assurance to the discriminating buyer that the national desire for quality is being adequately safeguarded.

National Aniline *and* Chemical Co., Inc.

21 BURLING SLIP

NEW YORK

manufacturers and railroad men of the country, is a different type of shipping container, preferably one made of metal, which could be used over and over again."

And now I come to the point of how you gentlemen can assist in remedying these conditions. It is necessary to give a brief review of what has been done.

Lower Rate Asked

When this metal container was perfected some four years ago application was made to the Classification Committee of the railroads for a rate that would permit shippers to use it profitably. Before the committee came to a decision application was made to the Interstate Commerce Commission for a rate, the suggestion being made that shipment in this and similar containers could be made, the freight charge being based on the net weight of the contents instead of the gross weight of the container and contents. Obviously the present rule makes the use of this container on any broad scale impossible. It was also suggested that a ruling be made, permitting the shipment of the knock-down containers at one-half of the fourth class in the western and southern and fifth class in the official classification territory. It would be difficult to conceive of a commodity possessing greater density than 70 pounds per cubic foot or more ease in handling that moves at less than carload rates. Other less than carload commodities possessing qualities that make their cost of hauling higher more at rates as low as those suggested.

However, acting on the theory advanced by its examiner, the Commission dismissed the petition on the theory that if you could not grant all the relief asked for you could not grant any relief, and on a second hearing before the Commission the examiner disposed of the case on the theory, "The commission has never knowingly issued an order the necessary effect of which would be to aid and extend a grant made by the Patent Office." Of course this box is patented, but we never asked for a ruling which would require shippers to use this and this only. We have consistently maintained that any container offering the same protection deserves equal freight classifications concessions

Benefits of Steel Container

To sum up, a favorable shipping rate, the only obstacle in the way of the extended use of metal for shipping container, would enable shippers to transport their freight safely; their commodities would be delivered to their customers in good condition, and they will have satisfied customers instead of dissatisfied customers and loss and damage claims. The carriers will be benefited, for they will be able to handle goods delivered to them more quickly and cheaply, with less hazard and with an increase to their net revenues; and the public will be benefited, as many commodities which are now destroyed by being shipped in flimsy containers will be conserved. Labor now devoted to containers that are destroyed with practically one use may be diverted to the production of things of a more permanent use, and forest products now being destroyed, will be conserved to meet the increased demands therefore.

Now we come to the question of what concretely you can do to bring about the desired change. I have barely skimmed over the situation. First of all, become thoroughly informed on the use and benefits of metal as compared with wood and fiber for shipping containers. Then take the initiative. Yours is an industry that must be recognized by the rate making powers of the railroads. Get busy. Let the rate commissions of the roads that handle your products know you believe in the justice of a modification of the present rates, that revised rates will benefit you, your industry and the whole country. It takes constant hammering, but it will be worth all the effort all of us can make.

THURSDAY

The sessions this day occupied the attention of the technical men chiefly, the program being in the nature of a symposium on chemical engineering subjects. David Wesson, chairman of the American Institute of Chemical Engineers, called the meeting to order and spoke on the work that had been accomplished by the chemist in the industrial field. Thomas W. Pritchard spoke on a new method of destructive distillation by which it is possible to control the heat in the retort by controlling the flow of gas. "The Nitration of Hydrocarbons" was outlined by A. Hough and W. Savage, while Robert G. Guthrie read a paper on "Recoverance: A Physical Property in Material and Its Importance." Charles Herty, who played such a prominent part in the activities of the exposition, made a four-minute talk to the chemical engineers on "Another Weapon for Defense." This symposium attracted more than 200 chemical engineers, who came from all parts of the world. The more important papers delivered at the sessions are reproduced in the following pages.

Some Duties of Chemical Engineers

By DAVID WESSON

President, American Institute of Chemical Engineers

This wonderful exposition which we are attending may be considered largely due to the work of the chemical engineer. If it had not been for the chemist, there would not have been anything to show. It took the chemical engineer, however, to translate laboratory results into accomplishment, and it does not seem as though we were taking too much to ourselves as chemical engineers, in claiming considerable credit for the many useful and beautiful things now being shown in this great building.

As I look upon this wonderful exposition, I cannot but feel that it is another milestone in the path of progress of our profession. The text "By their works thou shalt know them," seems particularly applicable.

It is unnecessary to expatiate on the many magnificent exhibits scattered throughout the exposition. They speak more eloquently than words of the triumphs of applied chemistry, which is nothing more than another name for chemical engineering.

We all think we have done very well and have performed real service to the special industries in which we are engaged, but we must not for a moment lose sight of the fact that the training which has enabled the chemical engineer to contribute to the wealth of his country in furthering the development of its material resources, can be applied to equal advantage in furthering the country's political and economic welfare. While doing our duties as chemical engineers, we must not lose sight of our duties as citizens.

It is unnecessary to state what we all know, that this is a time of readjustment. Our country has just been passing through an era of reckless extravagance unparalleled in the world's history. We are confronted on all sides with the high cost of living. It is our duty as chemical engineers to do what we can to see that the government of our country is in the hands of those who will conserve its resources and pass laws that will prevent waste. There are various measures now pending before Congress which are of great interest to us as chemical engineers and as citizens. It is our duty to take an interest in them and to encourage our Congressmen to stand up for them by writing them personally.

There is a bill now before Congress to consolidate the activities of something like 40 bureaus now scattered through several departments of the government, into a department to be known as "The Department of Public Works." Full information will shortly be sent to every member of the institute concerning this new reform, and it is hoped that every member will write to his Congressman and ask him to support the bill, which will save many millions of dollars per year in the operation of the government and incidentally help the taxpayers.

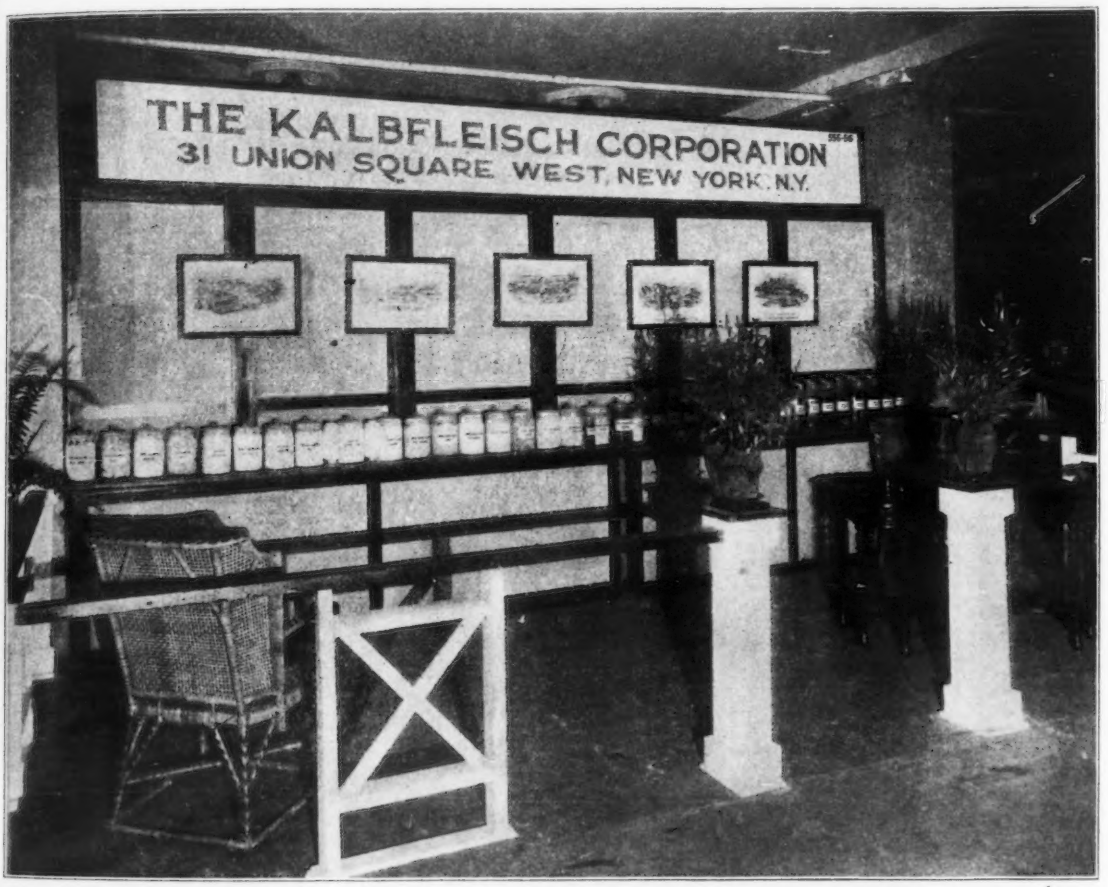
Patent laws are now pending in which we are all interested. As chemical engineers we should show our interest in these laws by telling our Congressmen what we want and keep after them until we get it.

We will soon see bills brought up in Congress for drawing a protective tariff wall around our various industries. As chemical engineers, and as citizens, it is our duty to study these bills and give to our Congressmen, as far as possible, the benefits of our knowledge and experience, to the end that whatever is done with the tariff, it may be done in the right direction and along scientific and economic lines.

Furthermore, if in order to accomplish our duties as citizens, it should be necessary for us individually to go into politics, we must not shirk our duties, but put on our gas masks and enter the field which we preferably would avoid.

There is another thing which we can do as individuals. As chemical engineers we are, naturally, economists when it comes to the proper operation of industries. As individuals, it is our duty in this readjustment period to set the example of thrift. We can if we wish, follow the example of one of our Presidential candidates who says he makes one pair of shoes last two years, or we can emulate the case of the Irishman who, when told his coat was too short, said it would be long enough before he got another one. The high cost of living of the present day is due to extravagance, and anything which we can do to curb it will be a true service to our country.

BOOTH OF THE KALBFLEISCH CORPORATION



A New Method of Destructive Distillation

By THOMAS W. PRITCHARD

I shall try to interest you with a brief description of a new method of destructive distillation. I shall also endeavor to avoid so far as possible technical details.

Perhaps no problem of a technical nature involves as many unknown quantities, both chemical and physical, as this does. We in our research do not claim to have solved these problems, but we have, we believe, opened the door to their solution by providing a process whereby destructive distillation may be carried on under definite control. It is conceded that the all-important factor in destructive distillation is control of the temperature at all times. The yield and the quality of the products produced are directly dependent on this. Destructive distillation of organic material, such as wood, bone, coal, shale and industrial wastes as generally carried on, involve rather high temperatures and practically no definite heat control. In many cases the variations in the distilling chamber will vary several hundred degrees in temperature, and the results of this sort of treatment are (1) uneven temperature throughout the charge, material close to the hot walls has been broken down before the center of the charge has been changed. This results in a mixed distillate of an inferior quality as well as an excess of fixed gases owing to the actual destruction of the distillates themselves. There is the additional problem of removing the vapors of distillation from the chamber, and in ordinary methods this is accomplished by the generation of enough pressure from the process to force the vapors through the condenser, which, to say the least, makes the process slow. It was to overcome these defects that the present process was devised, and I will try and give you a brief description of the application of the principle of circulation as applied to this work.

The material to be distilled is placed in a closed retort. This retort may be either vertical or horizontal, depending on the class of material. The retort is sealed and heat is applied to the outside walls. An outlet pipe from either top or bottom of the retort leads to a condenser. So far we follow the old method, but from the condenser the vapors, or such as are not condensable, are carried to a closed blower or fan, and from there are forced through a super-heater and returned to the retort, passing through the distilling mass, and by means of their positive carrying power and sweeping effect they not only distribute the heat units through the mass, but act as a scavenger and carry out the vapors formed as rapidly as is desired.

The rate of flow of the gases through the retort serves as a direct means of temperature control without regard to the heat applied to the outside walls of the retort. The cycle of circulation is kept up until by the temperatures and flow of distillates we know that the operation is completed. If desired the fires can then be drawn and the circulation still continued, and we get a rapid and even cooling of the charge, which allows us to remove it in much less time than we could otherwise do.

The benefits from this method as applied to this work may be summed up as follows:—(1) There is a definite temperature control during the entire operation; (2) The time of distillation has been reduced at least one-third; (3) The quantity of distillates has been in every case increased, and in some cases this increase has been enough to pay for the entire operation; (4) The quality of the distillates is improved and they are uniform and can be produced of a definite standard, which is impossible by the old method; (5) The distillates are in all cases much more easily refined and the refining losses are less; (6) By means of temperature control some unusual facts have been developed, and I am going to cite one instance. We distilled a charge of Tennessee cannel coal at a temperature of 500 degrees C., with the result as follows:—

Result of Run No. 31

Cannel coal, 300 pounds. Maximum temperature of distillation 500° C.

Coke, 65.33 per cent.; tar oils, 19.86 per cent.; ammoniacal liquid, 3.64 per cent.; gas, 11.17 per cent.

Tar oil recovery per 2,240 pounds, 56.46 gallons.

Benzol, 1.73 gallons; toluol, 0.49 gallons; solvent naphtha, 34.95 gallons; distillate over 200° C., including tarry acids under 200° C., 19.29 gallons.

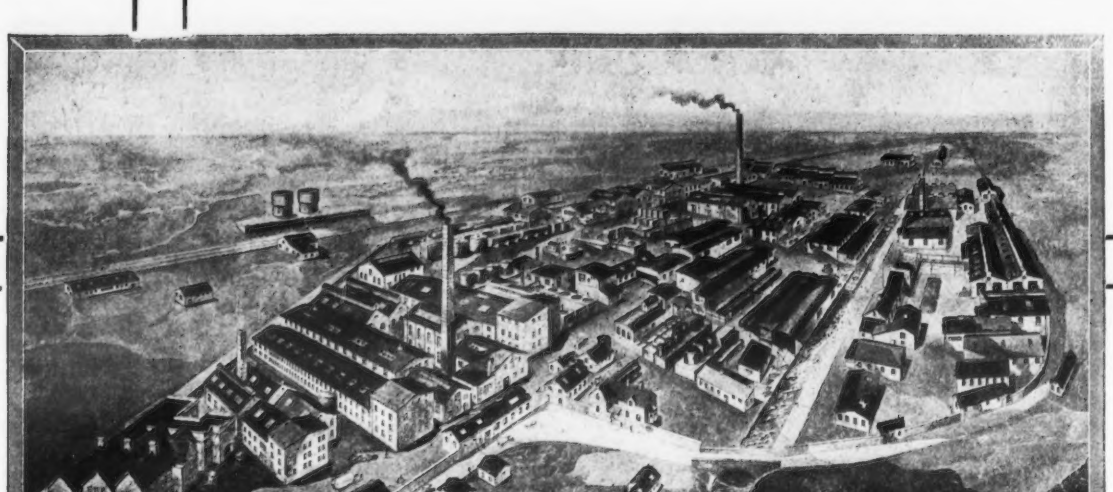
Ammoniacal Liquor

The water condensate amounted to 9.79 gallons per gross ton and contained 1.506 pounds of ammonia (NH_3), giving a liquor of NH_3 strength of 1.98 per cent.

Gas—CO_2, 5.2 per cent.; illuminants, 12.8 per cent.; C_2, 0.2 per cent.; CH_4, 8.8 per cent.; H_2, 10.7 per cent.; N_2, 58.4 per cent.; specific gravity, 0.464. B. T. U.'s per cu. ft., 30" Hg. and 60° F., 624.0; 7,075 cu. ft. per gross ton.

Light Oils from Gas

Benzol, 0.822 gallons per gross ton; toluol, 0.33 gallons per gross ton; solvent naphtha, 0.702 gallons per gross ton; ammonia (NH_3), content of gas runs



Works
at
RUABON
N. WALES

THE GRAESSER-MONSANTO CHEMICAL WORKS, LTD.

is an amalgamation of the British interests of

Monsanto Chemical Works
of ST LOUIS, U. S. A.

and the old established firm of

R. GRAESSER, Ltd.
of RUABON, NORTH WALES

Leading European Manufacturers of
Phenol Cresols and Allied Products

The new firm is beginning the manufacture, at its works in Ruabon, the fine and medicinal chemicals produced by the parent company in Saint Louis

Offices are maintained in London at
62 LONDON WALL E. C.

Monsanto Chemical Works
SAINT LOUIS, U.S.A.

Manufacturers of

Fine and Medicinal Chemicals, Intermedirtes
and Heavy Chemicals

2.60 pounds (NH_3) per gross ton. This gives 4.206 pounds (NH_3) per gross ton.

Another feature of this process which opens decided possibilities is the fact that many materials which seem to expand in spongy masses under ordinary distillation methods are perfectly tractable by this, and cannel coal, we may say, is one of these materials, as well as our very rich American shale.

I may say that our first commercial plant is erected and begins operation this week. This plant will have a daily capacity of 20 tons and will operate on bone for the manufacture of bone char.

Recoverance: A Physical Property and Its Importance

By ROBERT G. GUTHRIE

Physical properties of any material are determined and measured by means of various tests. Tests intelligently made invariably result in improved methods, also greater insurance of permanency and reliability of the product, all of which means greater satisfaction, not only to the producer, but to the consumer. Tests result in certainty replacing guesswork, knowledge replacing belief, and modern practice quite invariably sidetracking tradition.

Until recently, most testing problems have been approached from only one angle, i. e., what were the resisting forces of the material; no particular attention having been given to its comeback qualities.

A great many splendid efforts have been made recently to determine more comprehensive testing methods, also to duplicate for testing purposes more exactly the actual conditions that a material may undergo in service. A great many of these tests have been elaborately worked out and were found to mean very little, while a great many of them have been of untold value to the scientific and commercial world. It is not the purpose of this paper to lay down definitely rules as facts regarding recoverance. I realize that no person or persons are infallible as to their theories and beliefs, and the primary object of this paper is to excite thought along this line by setting before you a summary of the work that has been done in the Widney Test Laboratories on this property of material called recoverance.

Extensive research on recoverance has been carried on with a view to relating the recoverance values of various materials with the fatigue, wear and durability values of said materials in such a way that the adaptability and quality of any material for any specific purpose may be arrived at in simple, understandable terms and by simple, quick tests. In order that you may know what I mean by recoverance, I will give you the general definition of recoverance, as established by S. W. Widney, and also the explanation of it.

What "Recoverance" Is

Recoverance is the capacity of a material to return immediately the energy that has been imparted to it by any external forces.

In other words, when the molecules of a material are forced by compression, tension or bending from their relative normal position, the force immediately exerted by these molecules after the disturbing force is removed, in their return toward such normal position, is the recoverance of the material.

The recoverance figures as they are given in all of these tests represent a percentage, depending upon the areas beneath the increment of loading curve, and decrement of unloading curve. I speak of the rate of recoverance as regards fatigue, and these figures are in reality manifestations of the rate of recoverance. An explanation of this will qualify the use of the word "rate." Not knowing of any mechanism available capable of recording a recoverance curve, or the rate of recoverance following the instantaneous removal of the total load necessitates the plotting of a recoverance curve under a series of loads. These curves, however, will be the same in either instance, whether they are the result of the application of one load and its removal, or this same amount of load applied in several increments and removed in successive decrements.

In a curve plotted automatically covering the action of the material under a cycle of stress or repetitions of such cycles, the unloading line will diverge from the loading line in exactly the same way of one plotted under load. But, in plotting the curves under load, the complete cycle of loading and unloading is stopped during its course at definite points represented by the weight of each increment, and the deflections noted.

After this material has been loaded to any predetermined number of increments, and any of these increments removed, a point is reached which does not coincide with the corresponding point on the loading line. A loss then is represented by the divergence of the unloading from the loading line, and as long as this particular load remains upon the material, this distance will represent a total loss in strength to the material. If, however, the total load is removed at one time, similar to the removal of the load during repetitions of stress, this curve will not stop at any of these points, but will pass through them on its course back to the origin, O. It then follows that whatever the recoverance figure may be, the rate of recoverance will be directly proportional, i. e., if the curve of a material is plotted under load and a definite recoverance noted such as 90 per cent., and another graph plotted covering a different material showing a recoverance figure of 40 per cent., it will then follow at the material showing the recoverance value of 40 per cent. is lower by 50 per cent. in recoverance, and also lower by 50 per cent. in the rate of recoverance.

It then follows that the lower the percentage of recoverance, the lower is the rate of recoverance, and the higher the percentage of recoverance, the higher the rate.

There are in use three ways of measuring recoverance: recoverance by bending, recoverance by tension and recoverance by compression.

Recoverance and Hysteresis

The relation of recoverance to hysteresis will now be seen, and using a basis of 100 per cent. we will then have 100 per cent. minus the recoverance equals the hysteresis, or 100 per cent. minus the hysteresis will equal the recoverance.

As regards metals, I do not say that recoverance alone is a conclusive measure of a material's susceptibility to fatigue; but the recoverance of a material is a direct indicator of the material's ability to withstand fatigue. After a great number of tests on metal bars of various composition, the following theories are set forth as regards the relation of recoverance to fatigue.

The definition of fatigue as given in Merriman's "Mechanics of Materials" is, "the loss of molecular strength under stress often repeated" and I am speaking particularly of stress within the so-called elastic limit.

The direct factors governing fatigue are the manner, frequency and magnitude of stresses. It follows then that any material will fatigue and ultimately fail when the rate of repetitions of stress of any magnitude, within the elastic limit, is greater than the rate of recoverance, and conversely, there will be no fatigue when the rate of repetitions of stress, of any magnitude, within the elastic limit, is less than the rate of recoverance. There is however, a recoverance beyond the elastic limit, i. e. beyond what we now call elastic limit, and this promises to be a very important and interesting field of investigation, although to date we have not done a great deal on this.

I am speaking at present of metals, which are a crystal substance and obviously the recoverance beyond the elastic limit of such a substance is a great deal less where the elastic limit is nearer the ultimate than it is in a material where the elastic limit and the ultimate are farther apart. A material such as boxboard might show an ordinary amount of recoverance within its elastic limit, and between the elastic limit and the ultimate will show a proportionately greater amount than does a steel, whereas the steel will show a proportionately greater recoverance within the elastic limit than does the boxboard, i. e., I do not mean that boxboard may be compared to steel, but that the boxboard will show proportionately greater recoverance between its elastic limit and its ultimate than the steel would between its elastic limit and its ultimate, as compared to the recoverance below the elastic limit of the steel, and in an amorphous material such as fused silica, it would be obvious that all the recoverance it would have would be below the elastic limit, because the elastic limit and ultimate are so close together that we probably would never be able to measure any recoverance between the two. What I have just said seems to be characteristic of these three different characters of structure in any material, and evidently then the recoverance is governed not only by homogenity of structure, but by density and fineness of structure as well.

There is also a phenomena exhibited by different materials that is theoretically common to all, but is more practically apparent in such materials as paper, textiles, felts, rubber, etc., and that is, that there is not only the recoverance, which is you will remember, the immediate comeback of the material, but there is after the recoverance a noticeable creep which in some instances reduces the original hysteresis area as much as 50 per cent. In plotting curves covering tests of a material of this nature, we have in reality three areas beneath the increment or loading curve, namely, the recoverance area or immediate comeback; the creep area, the extent of which is dependent upon a time factor, and the degrees of accuracy of the instrument used; and the hysteresis area, a part at least of which is a definite loss of the energy applied which results in a loss of molecular strength. However, there evidently is a part of this hysteresis area which may belong more accurately to the creep area, and should be characterized as slag. Therefore, the true lines of demarkation between these areas and the extent of the areas themselves are dependent upon the accuracy of the methods used to determine them. However, this does not alter the fact that they exist in material, and definite knowledge regarding them should prove of great value in determining the adaptability of any material for a given purpose.

Metal Stresses

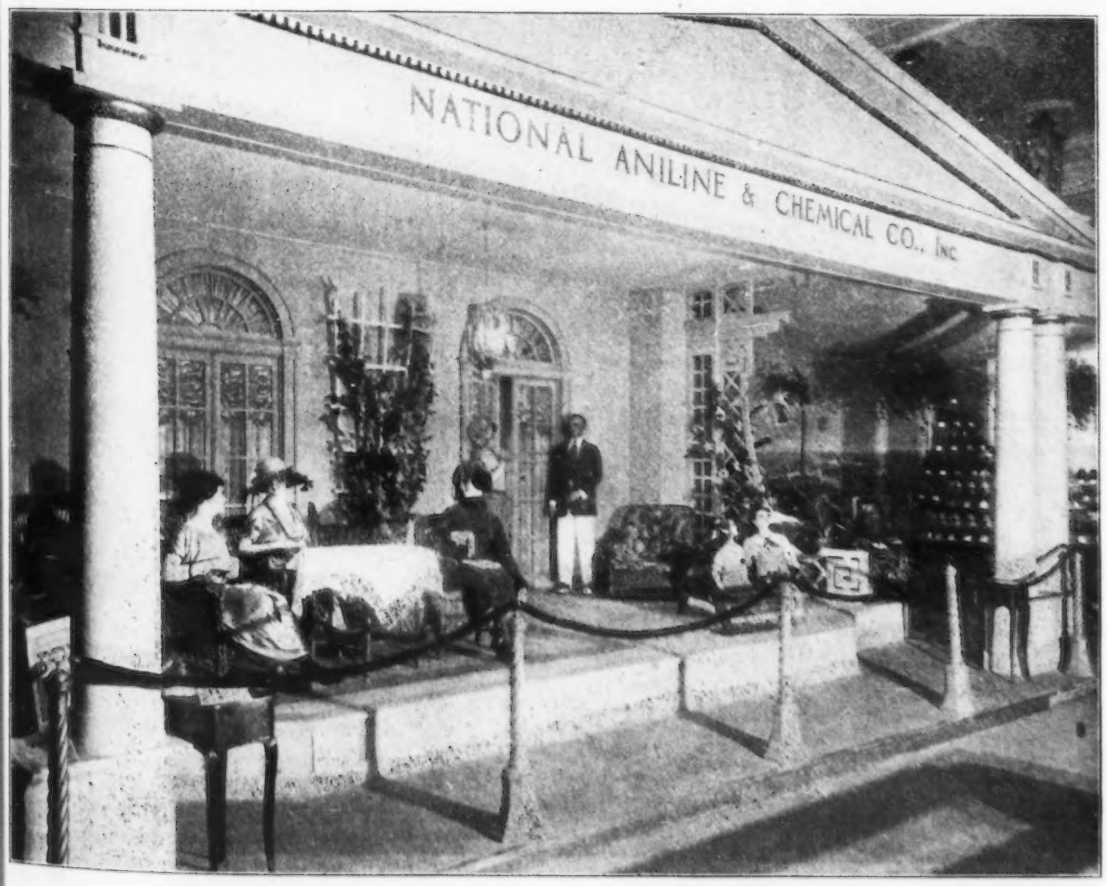
I have been speaking of the elastic limit of various materials, and although I recognize the present means of determining the elastic limit, I also believe that we will eventually arrive at a better understanding of what the term elastic limit really means and its relation to hysteresis. I personally believe that the hysteresis is proof that the elastic limit is zero, according to the following:—

Hysteresis, the accumulative result of having passed an infinitesimal number of elastic limits of infinitesimal magnitude, and there probably exists in matter as many elastic limits as there are subdivisions of matter, and the elastic limit of the smallest subdivision is zero.

What actually happens when a bar of metal is stressed is that first the slightest load will theoretically cause, to some degree, strain. It may be too fine to measure, but it nevertheless exists and inasmuch as the smallest subdivision has a zero elastic limit and each subdivision above the smallest is the result of a combination of these unit subdivisions, it then follows that hysteresis begins to develop as soon as any stress is applied, and as soon as the smallest amount of hysteresis capable of existence is devel-

CHAS. F. GARRIGUES CO. BOOTH

LIFELIKE EXHIBIT OF NATIONAL ANILINE & CHEMICAL CO.



E. M. JAVITZ & CO., Inc.

:: :: :: IMPORTERS :: :: ::

One Hudson Street, New York City

Telephone Canal 2090-1 Cable Address "Javico"

Citric Acid
Tartaric Acid
Cream of Tartar

SPANISH SAFFRON
BEESWAX
LICORICE PASTE
GUM ARABIC

BOTANICAL DRUGS

SAL AMMONIAC
CRESYLIC ACID

Sole U. S. A. Agents for

GEBR. FRENCKEN'S
(HOLLAND)

Potato DEXTRINE / STARCH / FLOUR } *Imported, Dutch*

oped, it is evident that the elastic limit of the smallest subdivision of which matter is capable has been passed, and that indicates that the elastic limit of any matter is proportional to the degree of subdivision of which matter is capable, and if the smallest subdivision of matter equals 1 the elastic limit will also equal 1, and the result of the limit of elasticity which is hysteresis, is also equal to 1.

Inasmuch as all matter possesses the property of recoverance in some degree, you can readily see the value of being able to determine and understand it, and after this is accomplished it will no doubt open up a great many avenues of explanation regarding the peculiar properties various materials exhibit.

In the work I have done on this property and in all the tests that have been made in the Widney Laboratories, there is one outstanding feature, and that is that the recoverance of a material reflects that material's quality.

We now have definite units of measurement of time, weight, distance, etc., and ultimately and probably before long definite values will be universally established whereby the quality and durability of any material will be measured in units of recoverance.

Progress in the By-Product Coke Industry

By C. R. BELLAMY

The year 1919 is memorable to the coke industry in the United States, for in it, for the first time, the production of by-product coke exceeded that of beehive coke. This fact is at the same time of vital importance to all our industries. For as Floyd W. Parsons has expressed it, "The industrial prosperity of leading civilized nations depends upon their utilization of fuels and metals." In this statement is found the real significance of the change from beehive to by-product coke predominance. Better utilization of coal, our basic fuel, is the beginning of real conservation.

Our by-product coke oven industry, with close to 11,000 ovens in operation, at this time, is one of high dimensions, and the modern cooking plant one of the great achievements of chemical and mechanical engineering. The results of a modern plant show what progress has been made. The high yields indicate improved methods while the uniform yields indicate the extent in which operation is under control. A better knowledge of the factors that are essential for good results, coupled with the ability to control these conditions is the feature of our best plants. Before going into details concerning operation data of one of the most modern plants, let us briefly trace the growth of this industry and the progress that has kept pace with this growth. In the writer's opinion, the expansion of the by-product coke oven has been marked by three distinct periods, which with the attributed cause are given in order of sequence.

1. Recognition by the steel industry that by-product coke could be made that was superior to any beehive coke.

2. Recognition by the gas industry of the fact that in the by-product coke oven was its opportunity for development on the lines of real efficiency and economy.

3. General conviction that the market for benzol, ammonia and tar was firmly established and able to absorb all possible production from coke ovens.

The first period was realized by overcoming the old time prejudice of the blast furnace operator and then seeking his co-operation in determining what constituted a satisfactory metallurgical coke. To illustrate this, the work of the Semet-Solvay Co., in conjunction with that of different blast furnaces, is most interesting. For years this company made daily all the tests of which it had knowledge, such as specific gravity; porosity; shatter; loss in CO_2; size of pieces and structure. These tests accompanied by investigation and research at ovens and furnaces finally led to the fixing of certain definite standards, and by strict adherence to these standards by-product coke has come to sell at a premium. Factors which are considered essential to the production of high grade furnace coke are:—

1. Proper preparation of the coke in all respects, including size.

2. Uniformity of the coal mixture used in the manufacture of coke, thereby producing coke of reliable chemical composition.

3. Uniformity of heating of the charges in the oven, thereby controlling the physical structure of the coke.

Coke Oven Gas

The commercial value of the surplus gas from by-product coke ovens was slow to be appreciated, and it was only about eight years ago that any general recognition of this value was apparent. Since then the progress in this direction has been so remarkable that today the by-product oven looms up as the real solution to the problems confronting our public gas utilities. Very many of the large cities east of the Mississippi River are now supplied with coke oven gas straight or mixed with water gas. The literature of the gas industry as concerns manufacture is now largely devoted to the by-product oven, and it has given us many valuable papers upon this subject.

In this field again co-operation has meant success. Joint investigation by the two industries concerned has made it possible for the modern by-product plant to deliver a coal gas that will pass the most exacting specifications as to B. T. U.'s, candle power and purity. And this gas can be produced so economically that no other process can compete. Some of the factors that make the production of such high grade gas possible are:—

1. Proper mixture or proper coals.
2. Tight ovens.
3. Proper regulation of pressure in ovens and in the hydraulic mains.
4. Proper carbonization temperatures.
5. Constant and reliable observations.

During the world war the by-products from coke ovens were found to be indispensable. Because of their extensive application at that time the merits of these products are now appreciated to the extent that they are just as indispensable in times of peace. As soon as this market was established the coke and gas industry was quick to avail itself of the fact, and the growth of the industry has been very rapid since then (1914).

The by-products are the same now as before the war, although at that time the Semet-Solvay Co. was the only commercial producer of light oils. Improved methods have, however, resulted in much better yields of these products. This improvement consists chiefly in the control of operating conditions. There is an old coke oven axiom that "temperatures, incident to the so-called high speed operation, seriously affect the yields." Under modern practice this has been changed so that it can be said that, temperatures properly related to the speed of operation do not seriously affect the yields. And likewise the other determining factors are now under regulation.

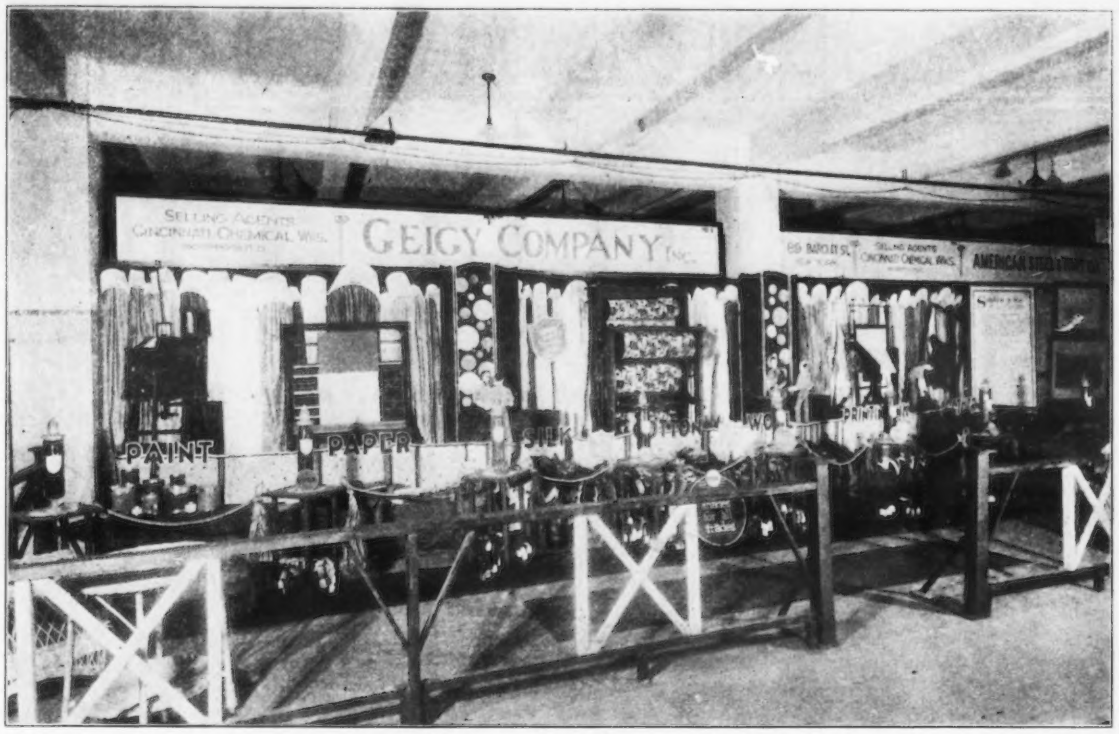
The modern practices and methods are well exemplified by the plant of the Ford Motor Co. at River Rouge, Mich., which is considered by many to be the finest by-product coke oven plant in the world.

Early in May it was my good fortune to study this plant for several days, and in this article I want to discuss certain features of the equipment, operations and results, which particularly impressed me. The data given here is that of actual results. The yields are especially important, not only because they are high, but because of their uniformity through varying speeds of operation.

This plant was completed and put in operation in October, 1919. Its chief function is to supply a high grade metallurgical coke to the Ford blast furnaces. At the same time a contract with the Detroit City Gas Co. calls for 10,000,000 cubic feet of 18 candlepower and 600 B. t. u. gas per day. Thus these ovens constitute a combined coke and gas plant and must maintain the highest quality in both products. To do this the speed of operation must not give rise to conflicting factors, but rather, all conditions must be properly co-ordinated to the speed of operation. Due to the unsettled conditions in the coal and railroad industries, this plant has not had any really fast operation. In fact, very few plants have operated at full capacity during the period under discussion. The operation, however, has been performed at somewhat varying speeds, so that a study can be made of the effects, if any, of such changes.

The Ford plant consists of 120 standard Semet-Solvay regenerator coke ovens, built in two batteries of equal size. Each battery is independent of the other in regard to control of operation. The gas direct from the ovens is received by a double hydraulic main, one main taking the rich gas given off during the first period of carbonization, while the second main receives the remaining lean gas. This separation of gas during carbonization is performed in the usual manner, that is by valves which are easy to open and close and which can be reversed when and as often as desired. The rich gas and lean gas are treated exactly alike up to the benzol scrubbers. Here the treatment is different, and after passing through these scrubbers the two gases travel different paths, the lean returning to the ovens, the rich gas after enrichment and purification going to the city. The apparatus and equipment used to handle the gas is built in triplicate, one unit for the rich gas, one for the lean, with the third and middle unit as a spare. This spare unit is so connected to the system that it can take care of either the rich or lean gas as necessary. The importance of this feature is that repairs, apparatus cleaning and inspection do not cause inefficient or irregular operation. Having a spare system of by-

INTERESTING DISPLAY OF THE GEIGY COMPANY, INC.



DISPLAY OF MAURICE A. KNIGHT

ANACONDA

WHITE LEAD

(DRY BASIC CARBONATE)

"The whitest white lead we have ever seen."
—A Paint Grinder.

"Has 10% to 15% better hiding power . . . gives a larger yield and weighs about ½ lb. less to the gallon" [than the old sort]. Another Paint Grinder

"Every test we have made shows it to be O. K. in every respect." —A Third.

"An ideal carbonate for ready-mixed paints . . . and certainly a beautiful lead in oil." —A Fourth.

Dry-Color-makers and Printing-Ink manufacturers talk the same wan.

Have You Tried It Yet?

ANACONDA LEAD PRODUCTS CO.

GENERAL SALES OFFICE

Conway Building; 111 West Washington Street, Chicago, Ill.

Announcing

ANACONDA
TREBLE SUPERPHOSPHATE
48% P_2O_5 soluble

ANACONDA COPPER MINING CO.

FERTILIZER DEPARTMENT

GENERAL SALES OFFICE

Conway Building: 111 West Washington Street
CHICAGO, ILL.

product recovery apparatus and a spare for all essential machinery used on the ovens, this plant is enabled to operate on a time-table schedule. Every oven is pushed at the exact time scheduled, the schedule being observed with railroad precision. This regularity of operation, which is essential to the production of a satisfactory quality of surplus gas where high standards are required, means also that the load on by-product apparatus is uniform and favorable for maximum by-product yields. In the table of results it will be noted that the initial rich gas has been produced without an appreciable variation in B. t. u. value for over three months.

Each oven is designed for a charge of fifteen tons of pulverized coal and to carbonize this coal in any period from sixteen to thirty hours as desired. The capacity of the oven and the uniform coal charges are points that are worth emphasizing. At the Ford plant not only is the daily average charge per oven uniform, but there is very little variation in the weights of coal charged in the different ovens. The regularity maintained in this operation is shown by chart I, which gives average daily weight of coal charged per shift. This curve is posted in the foreman's office and closely watched by all three shifts.

The size of an oven is determined by the amount of coal that it can successfully carbonize. Size has so far been an index to the progress of the industry, increasing capacity resulting in lower unit costs. This because the plant, exclusive of ovens, and force required for operation and maintenance of complete plant is fixed and independent of oven capacity. That is to say, the power plant, by-product recovery apparatus, piping and other machinery will be practically the same for any given plant regardless of the capacity of its ovens, while the number of workers will be almost the same. The increased tonnage due to larger capacity of units will therefore give its yields at little or no cost of production.

Operating on an 18-hour schedule, the Ford plant has a daily capacity of 2,400 tons of coal. Were these ovens of 12 tons size the capacity of the plant on a like schedule would be 1,920 tons. In a 30-day month this would mean that the 15-ton unit plant would carbonize 14,400 more tons of coal than the smaller unit plant. The yields from this increased tonnage would be about 10,000 tons of coke, 345,000 pounds of ammonium sulphate, 45,000 gallons of light oil, 115,000 gallons of tar and 86,000,000 cubic feet of surplus gas. Figuring that the value of the coke recovered would cancel the cost of the additional coal and cost of producing by-products, there would be a net gain something like this:—

345,000 pounds $(NH_4)_2SO_4$@5c. per pound	$17,250.00
45,000 gallons light oil@15c. per gallon	6,750.00
115,000 gallons of tar@4c. per gallon	4,600.00
86,000 cu. ft. gas@20c. per M	17,200.00
Total monthly gain	$45,800.00

It is true that the initial cost of the larger plant would be greater, but the returns just enumerated would yield handsome interest on the additional capital required.

Ammonium Sulphate

The recovery of ammonia at the Ford plant is performed by the Semet-Solvay direct ammonium sulphate process. This process, which represents over eight years' extensive experience with direct methods, marks a notable achievement in chemical engineering. The process is direct in procedure, practically automatic in operation and produces a pure white salt. The high yields, which are obtained, are readily explained by the direct manner in which the gas is treated and by the control of the ammonia reactions.

In the first place, each oven is properly filled with coal, as previously described, so that favorable conditions exist at the start. The coke oven gas upon leaving the ovens travels a short distance from the hydraulic main and then passes through a two compartment cooler. From these coolers, an exhauster (Curtiss steam turbine) takes the gas and sends it under pressure through a tar extractor of the P. & A. type, then through another two compartment apparatus, called an economizer, from which apparatus it goes to the saturator. The gas leaves the saturator minus its ammonia, is freed of acid and then cooled for benzol recovery. This is the full journey of the gas so far as ammonia is concerned.

The gas enters the two compartment cooler at a temperature slightly above 80° C. In the first compartment the temperature is lowered about 30° C. and in the second compartment it is brought down to 30° C. This temperature of 30° C. has been found to be the critical one for proper condensation in conjunction with minimum effort for subsequent heating. The cooling medium is a weak ammonia liquor, which traveling over grids counter current to the gas is very efficient. The strength of this liquor is maintained so that only a minimum amount of NH_3 will be absorbed in the cooling of the gas and the condensation of the light tars. Separation of the tar and liquor is effected in the coolers, which have a large base, by means of decantation. The tar is drawn off from the bottom and runs to a decanter, while the liquor entering the suction pipe of the pump at a higher point, is sent through cooling coils and then back to the gas cooler. Each compartment of this cooler has its own circulation. A special constant level overflow device maintains a constant volume of liquor for circulation by carrying away an amount equivalent to that added by condensation and absorption of ammonia. Ammonia thus held in solution has to be liberated by steam and lime in a still, from which it returns to the gas at inlet to saturator. With this exception, the process is "direct."

The Curtiss steam turbine, whose primary function is that of an exhauster, serves in a three-fold manner. For in pumping the gas, it is at the same time an efficient tar extractor. Due to heat of compression, the gas leaves the turbine at 50° C. or about 20° C. higher than it entered. Thus the turbine is exhauster, tar extractor and heater combined. The P. & A. tar extractor removes the last trace of tar.

From the tar extractor the gas goes to the economizer, where it is brought in contact with the liquor of condensation from the hydraulic main to pick up and restore to the gas some of the water of condensation and free ammonia; the gas leaving the economizer is at the proper temperature for the sulphate reaction.

The clean gas at 70° C. enters the saturator, which contains sulphuric acid of 45 g. p. l. strength, that is nearly normal acid. The saturated acid is lifted by means of an air ejector into a tank in which crystalization takes place and the unsaturated acid drains back to the saturator. The salt goes to a centrifugal where it is first dried and then washed with water. It is dumped from the centrifugals into barrows, weighed and conveyed to a large hopper from which it is handled into storage by an overhead crane.

A small stream of fresh acid (60° Baume) flowing into the saturator keeps the strength at the proper mark. With acid of the proper strength and gas at the proper temperature, objectionable crystal formation does not take place in the saturator. The small amount of crystals that are bound to form on metal surfaces are not permitted to accumulate. Once each day for a few minutes the acid strength is built up 125 g.p.l. and thus all crystals are dissolved and a clean saturator maintained.

The results obtained at the Ford plant are indicative of the progress that this process makes in ammonia recovery. The high yields as shown in the table of operation data were obtained from a coal mixture containing 20 per cent. low volatile coal. From straight high volatile coal even higher yields may be expected.

As important as the yield of a by-product is the cost of production. The unit cost is the test that tells the tale. During the month of April this plant produced over 1,500,000 pounds of $(NH_4)_2SO_4$, with an operating force of five men per eight hour shift, and one foreman. This foreman also has charge of the light oil plant.

One of the most essential points in a direct ammonia sulfate process is clean gas. Practically all the treatment through which the gas passes, preparatory for entrance to saturators, is made with the one purpose of obtaining clean gas. Upon the success of this treatment the purity and color of the sulfate depends. Hence, the vital question is, "How clean is the gas?" To determine this, the filter paper method devised by the Semet-Solvay Co. has been found very valuable. The apparatus which is called the Tar Camera needs little description other than that given in sketch I.

An apparatus is here shown by means of which a known volume of gas can be drawn through filter paper and a comparison made of the color produced on the filter paper to indicate the degree of purification of the gas. As usually performed, two filter papers are used for each test to absorb the tar from 8 liters of gas.

The amount of tar carried by the gas should be reported by comparing these filter papers with a photographic scale, similar to that used in any color comparison quantitative test. Or where great accuracy is required the determination is made by weighing the filter papers before and after the picture.

This apparatus can also be used for the determination of H_2S in gas. In this test the filter papers used are, of course, moistened with lead acetate.

Ford Operating Data, 1920

Actual Results of Semet-Solvay Direct Ammonium Sulfate Process.

Date.	Dry coal charged tons per day.	Coal moisture c per cent.	Sulfate yield om. lbs. per ton.	Per cent. NH_3 in sulfate.	Acid consumed per lb. $(NH_4)_2SO_4$.	Per cent. free acid in sulfate.	Per cent. moisture in sulfate.
January	1,813	5.2	25.7	25.01	1.07	.169	2.25
February	1,813	4.4	26.5	24.94	1.01	.135	2.42
March	2,030	4.0	25.9	25.00	.95	.125	2.46
April	2,022	3.5	25.8	24.99	1.00	.112	2.16
May	1,911	3.5	26.8	25.00	1.02	.151	1.84

Surplus Gas

The method employed for the preparation for sale of the surplus gas from the coke oven plant is determined by the specifications which the gas has to meet. The general trend in the industry is toward the elimination of candle-power specifications and lowering the calorific value of the gas required for cities. Canada has now permanently adopted a standard of 450 B. t. u.'s and no candle power. Only three of the larger cities of the United States still cling to a high candle-power specification. This development is in direct line with the conservation of the natural resources of the country, and is to the economic advantage of both produce and consumer of gas. It is no longer good economy to enrich gas with benzol to produce candle power when the requirements for motor fuel are rapidly outstripping the supply. Money spent for enrichment of gas is practically all wasted as, with very few exceptions, the consumer derives no benefit therefrom. The purchase of special coals or the separation of the rich gas from the lean, or any other operation involving cost, to increase the calorific value of manufactured gas, brings no benefit to the consumer who must, of course, pay for this increased cost, and the Public Service Commissions and gas manufacturers should join in the determination and adoption of the standard of calorific value which permits a million B. t. u. to be delivered to the consumer at the lowest price. Of course gases containing high percentages of nitrogen, like producer gas, are not to be considered in this discussion. This argument is illustrated by the following table, which shows the B. t. u. per cu. ft. in the various gases when mixed with the theoretical amount of air required for their combustion. This mixture of gas and air is what the consumer actually burns, so it is clear that any of these gases, when properly burned with the correct percentage of air, will give the same results.

	Natural gas.	Oil gas.	Retort gas.	Coke oven gas.	Carburated water gas.	Blue water gas.
B. T. U.	91	93	91.7	91	92	88
Flame temperature	1,852°	1,915°	1,896°	1,892°	1,914°	1,928°

So the real point of interest to the consumer is which gas can be furnished to him at the lowest cost per million B. t. u.

In several cities, however, the legal standards still require the delivery of gas of high candle power and high B. t. u. content, and the gas from the Ford plant has to meet the standard of 18 candles and 600 B. t. u.

Light Oil and Gas Enrichment

The recovery of light oil at the Ford plant is so closely related to the enrichment of gas that these two subjects can well be treated together. As is usual in plants where surplus gas of high calorific and candle power specifications is sold to public utilities, the rich and lean gases follow parallel, but separate paths throughout the by-product recovery system. Up to the benzol scrubbers they are treated exactly alike, but from here on the treatment differs.

It is a comparatively simple matter to obtain large yields of surplus gas that will pass the average B. t. u. requirements, which have recently been lowered in most States. In such cases it is possible to remove practically all the light oils from the gas, and if so the rich and lean gases can be treated alike in the recovery of benzol, or the gases may be treated without separation, if the calorific standard permits. In being freed of its light oil the surplus gas is lowered in B. t. u. value, but at the same time it has all of its naphthalene removed. This treatment gives a gas suitable for distribution, and if separated, of 590 to 600 B. t. u. value. Such a gas meets the requirements of many cities which retain a high calorific standard, but it will not pass a high candle power specification, and where such exists it is necessary to produce a very high grade gas. Proper oven operation will yield such a gas, after which this quality must be maintained and delivered to the city without loss. For distribution it is essential that this gas be free of $C_{10}H_8$, but it cannot stand the loss of any other illuminant. Of course, all the light oils could be washed out, freed of naphthalene and then used to enrich the gas to the proper mark. A high grade gas would result, but the process would be rather inefficient and very expensive. The correct way is to take out the $C_{10}H_8$ without removing the light oils. This is accomplished at the Ford plant by the standard Semet-Solvay apparatus and methods. The procedure is as follows:—

The lean gas upon leaving the saturator is cooled, and enters the benzol scrubber at a temperature of about 25 degrees C. In this tall tower it is completely stripped of its light oil content by being washed with an absorption oil of like temperature. This absorption oil straw oil or ordinary gas oil, is circulated counter current to the gas flow and leaves the scrubber containing about 2 per cent. of light oil.

BOOTH OF BUFFALO FOUNDRY & MACHINE CO.

Cable Address—Minorca Phone—Beekman 941-4

MINER-EDGAR CO.

110 William Street - - - - New York

Warehouses—Brooklyn, N. Y. and Newark, N. J.

Spot Stocks

Quick Deliveries via Water Rail Truck

Denatured Alcohol
(any formula)

Wood Alcohol
(Methylene (pure) denaturing or other specifications)

Acetates
Amyl Butyl Ethyl

Alcohol
Amyl Butyl Methyl

Refined Domestic China Clays
(for Paper making and all other uses)

Cotton Solutions for all Purposes

MINER-EDGAR CO.

110 William Street, New York

Plants:—
Newark, N. J.
Monmouth Junction, N. J.

Warehouses:—
Brooklyn, N. Y.
Newark, N. J.

The rich gas upon leaving the saturator is likewise cooled and enters a benzol scrubber at the desired temperature. Here it is washed by one-half of the benzolized absorption oil from the lean scrubber, the other half of this oil going directly to the light oil still. The small circulation of benzolized oil absorbs all the C_6 H_6 from the gas, also some toluol and xylol, but removes very little benzol. Thus the gas is purified of C_6 H_6 without serious loss of other illuminants. The drop in B. t. u. and candle power, due to this treatment, is so slight that very little enrichment is necessary. According to the latest figures, only .07 gal. of light oil is vaporized per 1,000 cu. ft. of gas to bring the gas above specifications.

The most important feature of this surplus gas operation is the uniformity of results. Not only has the surplus gas yield been high, as will be noted from table of operating data, but it has been a yield of high grade gas. That is the important fact, for the yield of surplus gas means nothing until compared with the quality. Furthermore, this yield has been almost constant in amount through the varying speeds of operation. Every day from January 1 to June 1 the gas company has received practically 10,000,000 cubic feet of gas from these ovens; gas that has always been above the standard. This gas has been produced and delivered with scarcely any variation in B. t. u. or candle power values. The uniformity of these results appear remarkable in comparison to those obtained only a few years ago, but show what can be expected from modern ovens with advanced knowledge and methods for regulation. The maximum gas recovery which is here shown is one reason also for the uniformly high sulfate yield.

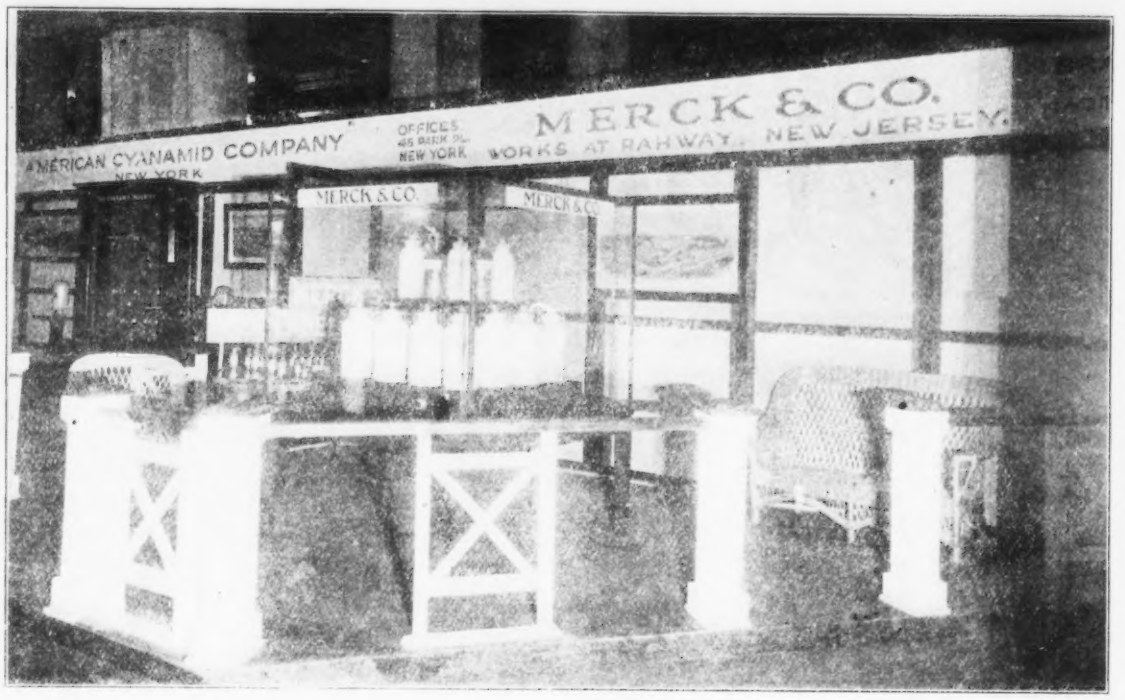
A description of the light oil still is hardly necessary, as it is of the standard Semet-Solvay type. No fractionation is made, but the light oil is purified washed and redistilled and sold as motor fuel. A satisfactory motor fuel consisting of benzol, toluol and xylol, mixed with an equal amount of gasoline gas, gave the following distillation results:

B. P.	Fahr. C.
Sp. gr. at 16 deg. C	.811
	Per cent.
Off at 85 deg. C	10
Off at 88 deg. C	20
Off at 91 deg. C	30
Off at 96 deg. C	40
Off at 103 deg. C	50
Off at 111 deg. C	60
Off at 130 deg. C	70
Off at 154 deg. C	80
Off at 197 deg. C	90
Off at 218 deg. C	95
Loss on dist	2.0
Residue	3.0

During the switchmen's strike there was a gasoline shortage in Detroit, which caused some worry but little or no inconvenience, due to the fact that the Ford plant was able to release 300,000 gallons of purified light oil for motor fuel. Tank wagons from the various companies came to the plant for oil and then distributed it throughout the city. Thus a serious situation was averted.

The light oil that is recovered by the method described comes mainly from the lean gas. The true yield is therefore the sum of the oil produced and the oil left in the rich gas. This total would mean a high commercial yield and one that would be possible wherever the gas specification was below 600 B. t. u. with no candle power requirements.

BOOTH OF MERCK & CO.



Ford Operating Data, 1920

Surplus Gas, Light, Oil and Tar Yields.

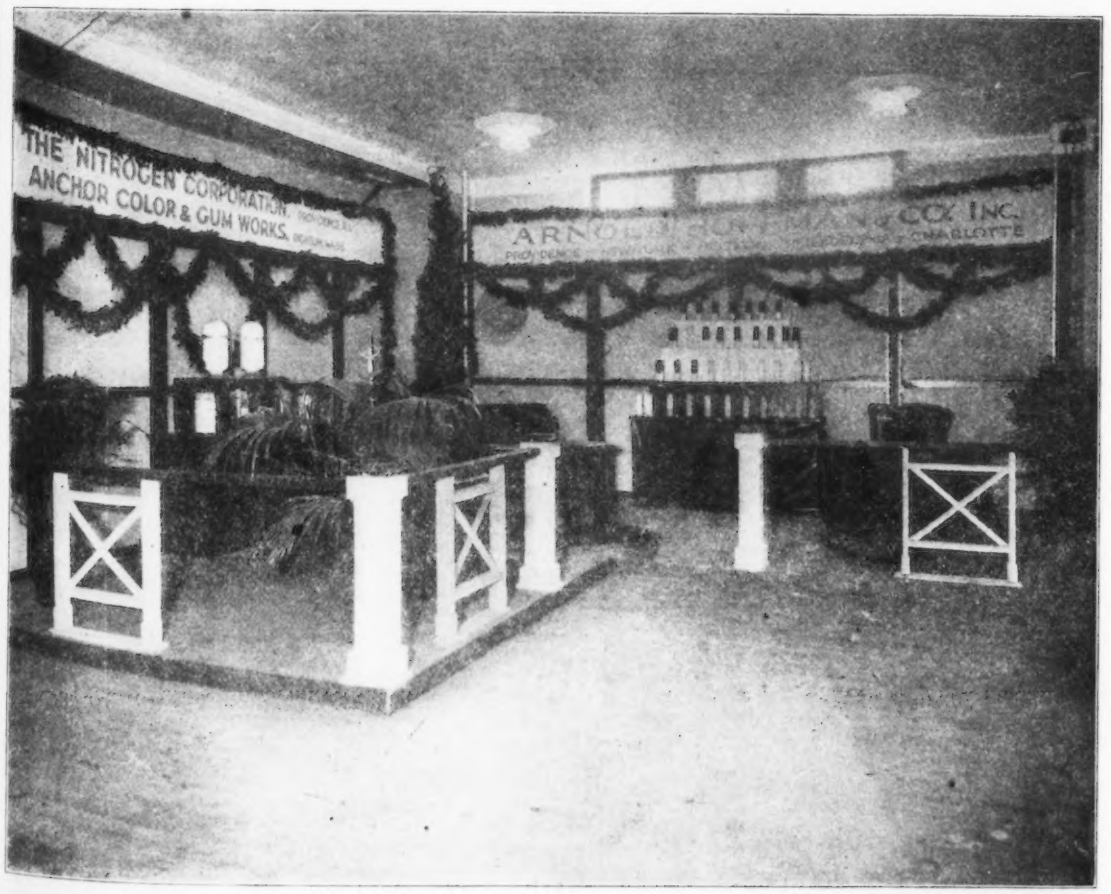
Date	Days on (thousand tons per day)	Total B. t. u. per cu. ft.	Gas to city (M. cu. ft.)	Candle power (mean spherical)	Candle power required by city ordinance	Light oil required for candle power	B. t. u. gas to city	Light oil produced, gals. per ton	Tar Lab. yield gals. per ton	Tar Acid gals. per ton
January	1,813	10.53	9,959	12.83	18.08	.33	636	2.32	2.65	6.02
February	1,813	10.39	10,135	13.82	18.17	.14	647	2.35	3.74	8.09
March	2,030	10.63	10,004	14.05	18.14	.10	648	2.61	3.76	8.84
April	2,022	10.52	9,906	14.27	18.21	.10	658	2.43	3.68	8.64
May	1,911	10.04	10,518	15.21	18.12	.05	643	2.42	3.45	8.51

The old-time problem of "What is to become of the tar" has apparently been solved satisfactorily. With the enormously increased supplies the market has kept pace, and today tar is selling at a decidedly higher price, but yet somewhat below its true value. Tar lends itself readily to a variety of uses, many of which are just beginning to be appreciated. The Ford experience affords an interesting illustration in this respect.

The original boiler equipment contained eight 400 horsepower Wickes boilers arranged for gas firing. The demand for gas was so heavy that tar was utilized in its place most satisfactorily and at a decided saving over coal, the value of tar being taken at five cents per gallon. When using tar the pump at the storage tank is run continuously, so that there is a constant circulation sufficient to meet the highest peaks and yet allow excess tar to be by-passed from the discharge to the suction line. In order to keep the tar hot the discharge line is wrapped with two 2-inch steam lines and the tar reaches the boilers at a temperature of 90 degrees C. At that point superheated steam is used to raise the temperature to 100 degrees C. and by means of steam injectors delivered to the tar burners.

When the price of fuel oil became almost prohibitory the Ford Co. began experimenting with tar to take the place of oil in the heat treatment of forgings, etc. This worked out so satisfactorily that they expect shortly to be using 15,000 gallons of tar per day, which will do the same amount of work as the 25,000 gallons of fuel oil formerly used. Part of this is due to the higher efficiency of the tar and the balance to improvements in operation. This tar is as it comes from the by-product coke plant, no further refinements being necessary.

NITROGEN CORPORATION—ANCHOR COLOR & GUM WORKS—ARNOLD HOFFMAN & CO.



Canada and the Chemist

By C. PRICE-GREEN

During the war the chemical industries of Canada made phenomenal strides, and it can be said without exaggeration that development followed development in a most sensational manner.

During the period of the war it is worthy of note that the exports of chemicals from Canada increased about 800 per cent., and the number of firms engaged in chemical industry has risen to the respectable figure of over 500 at the present time.

One cannot speak upon the resources of Canada without reference to that important medium which has made these resources available to the commercial world. I allude to our national railway system. The government-owned line, the Canadian National Railways, has grown remarkably in recent years and now has over 22,000 miles of line, the largest system under one management, and is operating freight steamers for the extension of Canadian commerce all over the world. Some of the units of the national system, notably its Western lines, formerly known as the Canadian Northern, have been the means of opening vast areas of rich agricultural country in the Northern parts of the prairie provinces and filling them with people which has created a most important market for the manufacturer of the Eastern provinces, and has perhaps contributed more to Canada's progress than any other factor.

As they are much in the public eye at present, I will first direct your attention to our forests. Today the United States is mainly depending upon Canada for its supply of paper and paper making material, and the demand is a heavy one as you use one-half the world's annual production of white paper. Canada is supplying 55 per cent. of this demand, which amounts to the equivalent of five and one-half million cords of pulpwood a year, which made into a pile of four foot wood, four feet high, would stretch 9,000 miles, or more than twice across the continent.

It may be of interest to you to know how Canada's pulp and paper industry has grown to a point where it can meet this demand. In 1890 it only exported to the extent of $120; today there are

Tartaric Acid
Citric Acid
Cream of Tartar
Rochelle Salts
Silver Nitrate

WILLIAM NEUBERG

6 CLIFF STREET NEW YORK CITY

Telephone, Beekman 1923—1935

Cable Address, "Neuberg, Newyork"

Chicago Office: 14 East Jackson Blvd.

Telephone, Wabash 8000

$250,000,000 invested in pulp and paper, and our production is valued at $120,000,000, and our exports $100,000,000, of which you receive 80 per cent., and in addition to this over 1,000,000 cords of wood to supply your mills. This is bordering on a controversial subject. Some people think that we are not supplying as much as we should, but in lumber parlance, we think we are going the limit.

I might mention that while industrial Europe consumes about 150 feet, B. M., per capita, the United States uses 350 feet, and for all purposes including lumber, firewood, ties etc., the United States consumes over 100,000,000,000 feet a year.

Price-Green then went on to describe the mineral resources of Canada. He told of the coals of Nova Scotia, which in conjunction with iron from Newfoundland and the mobilization of other commercial forces would result in one of the largest productions of iron and steel in the world; of the oil shales of New Brunswick and economic minerals of Central Ontario, which embrace the largest number of minerals within a given area on the continent. He spoke of the great Laurentian plateau, of which little more is known than its geological structure, but where the pioneer railways had opened up wonderful finds, such as the great mineral fields of Sudbury, which supply 80 per cent. of the world's nickel; the silver mines of Cobalt, which have yielded so far over $200,000,000; Gowganda and Montreal River.

Porcupine Gold Fields, which was acknowledged today to contain the world's greatest gold mine, having produced so far $50,000,000; Kirkland Lake, Larder Lake and Shining Tree, which also give great promise. The wonderful great copper find west of Lake Winnipeg. He told them that Quebec produced 85 per cent. of the world's asbestos; of the coal fields in Alberta, the greatest in the British Empire; of the wonders of the Mackenzie Basin, and the great Cordillian Range in British Columbia—1,300 miles long by 400 miles wide, known to contain much valuable mineral, but so far only scratched.

Canada's fisheries, described as "the greatest in the world," were also included in his remarks, with 7,000 miles of shore line on the Pacific coast and 5,000 miles on the Atlantic, the latter practically inexhaustible and having the advantage of the banks being only from 10 to 15 miles from shore. These fisheries could produce ten times as much as at present without showing signs of depletion, and present not only a splendid opportunity for investment of American capital but one for the chemist in the utilization of the enormous waste which could be made to bring a large commercial return.

FRIDAY

This, the final symposium of the exposition, featured ceramics. Ceramics is a term little understood by the general public, but it is an industry that touches on the daily life of every person. At one time ceramics referred only to pottery, but its use has been broadened, and now it is accepted as embracing all those departments of industrial chemistry and scientific manufactvre in which silicate rocks and non-metallic minerals are wrought into form and made permanent by fire.

Most of the addresses made at this symposium were informal. President R. H. Minton, who presided, read an abstract from the report of a committee of the society on "The Significance Attached to the Term Ceramics in Ancient and Modern Usage."

In the address of Charles F. Binn on "Ceramics and the People" he called attention to the part the ceramic industries were playing in modern civilization by pointing out the many uses in the modern home. In the list of improvements that were due to the art of the industries he listed cement, windows, drains, bricks tile, wall tile, bathroom fixtures, sanitary fittings, electric light bulbs, glass screens for indirect lighting, sinks and laundry trays.

Attention was called to the wide diversity of interests of the ceramic industries in the United States and the success which had thus far attended the efforts to unite them. A recent report made by the committee on "Definition of the Term Ceramics," enumerates among the products of the ceramic industries the following:—

(1) All kinds of burned clay products, such as stoneware, earthenware, brick, tile, sewer pipe, terra cotta, china, porcelain and so forth.

(2) Cementing materials, such as Portland cement, dental cements, lime, plaster and a variety of magnesia and gypsum products whose constituents are of an earthy nature and which after a preliminary treatment which involves a calcination, acquires the property of "setting" to a greater or less extent, when mixed with the proper liquids.

(3) All varieties of glass and glassware, including quartz glass, glazes, enamels and many of the artificial precious stones.

(4) Enameled metal products, where the enamel itself is a ceramic material applied to the metal at high temperature, the metal serving only as a skeleton to give the desired form and strength to the glass which it supports.

(5) Refractory articles or materials, either wholly or partially composed of or manufactured from clay, silica (in its various forms), alumina (bauxite), magnesia (magnesite), lime, chromite, asbestos, zirconia, mica, the rare earths, certain carbides and nitrides, and in general any non-metallic product capable of withstanding elevated temperatures. In the case of all products of this class it is evident that a high temperature treatment is fundamental.

(6) Abrasive materials such as carborundum, alundum and zirconia (and by association finely divided silica and emery), together with the products manufactured from them by bonding with an earthy material.

(7) Various electrical and thermal insulating products in the manufacture of which earthy materials enter as an important element.

The industries named are so closely allied to one another that a recognition of this unity, of the nature of the bonds and of the close co-operation which such unity brings about is of the greatest importance to the future development of these industries and to the further progress in the underlying sciences which such development requires.

As already pointed out, the chemistry of silicon is common to practically all of these industries. This is also true with respect to the field of high temperature chemistry, or pyro-chemistry, as it has been called, and it is only through our comparatively recently acquired knowledge of how to produce, control and measure high temperatures in the laboratory that the modern advances in our knowledge of high temperature processes have been made possible.

Moreover, the material clay is utilized in one way or another to a greater or less degree in connection with nearly all of the ceramic industries. It seems, therefore, to your committee, that the elements possessed in common are so fundamental in importance that these industries should and will recognize their essential unity and will establish that co-operation of effort which this unity implies and which will prove to be a source of great strength in their future development. It is fortunate indeed that the American Ceramic Society includes all of the classes of industries and it is to be regretted that our fellow workers in England have not thus far seen fit to unite similarly in single technical organization.

SATURDAY

This was the last day of the exposition, the doors closing at 10.30 p. m. The entire exposition was turned over to the public, no symposium or program of any formal nature having been prepared. Motion pictures, which played so prominent a part in the exposition this year, held sway. All kinds of chemical and industrial processes from the manufacture of asbestos and perfumes to the mining of gold and silver in Ontario were displayed on the screen.

What was considered the most important meeting of the week was held at 6 o'clock in the evening at the Chemists' Club, when the Advisory Committee were the guests of the managers. An informal resume of the week's activities was made and the exposition discussed, not from the success that it has been, but from progress that has been made and the changes for the better that can be inaugurated in the exposition next year.

When Dr. Herty, chairman of the Advisory Committee, was asked to make a statement regarding the closing of the show, he said:—"After spending the greater part of my time about the exposition this week I am certain that more thought in preparing the booths, in determining their character and putting the story across to the public was evident than at any previous chemical exhibition. Every exhibitor has tried his best to make his booth attractive and there has been no hesitation about spending money to get the desired effects. The result has been the most successful show in the history of American chemistry."

But the Advisory Committee members are not the only ones elated over the success, because the exhibitors are just as enthusiastic. One of the leading dye chemists of the country said:—"The exhibition of dyes has demonstrated beyond a doubt that the United States need not depend upon any foreign country for dyes. The display at the Grand Central Palace this week includes dyes for every purpose, from the dyeing of minute organisms by physicians to all cloths.

"Some of the dye manufacturers have announced as many as 30 new dyes that were not on exhibit at the show of last year and they have indicated their determination to make the United States the leading country in dyestuffs."

And what was true of dyestuffs was true of ceramics, of chemical apparatus and of machinery used in the production of chemicals.

When he was asked to comment on the show one of the most prominent chemists in the country said:—"It has been a success. I never dreamed it would be so big, so beautifully exhibited, or so well attended. With few exceptions I believe that the cream of the chemical profession has been in New York city this week, and has enjoyed and profited by the exposition. They have all profited by the symposiums which were an important part of the meeting this year."

BOOTH OF THE NEW JERSEY ZINC CO.

GOOD WEATHER MADE TO ORDER

Chemical Exposition Brings to Light "Mechanical Weather Man"

The "mechanical weather man," one of the innovations that were shown at the Sixth National Exposition of Chemical Industries, at Grand Central Palace last week, has attracted wide attention. Strange as it may seem, this machine actually makes weather to order. Willis H. Carrier and J. Irvine Lyle decided some time ago that once in a while nature fell down on its job, by throwing in a poor day. They argued that this could be remedied, so that every day would be a "good day." The science of making every day a good one is known as "air conditioning," and has four basic principles:—The positive automatic control of (1) the temperature, (2) humidity, or the amount of water-vapor mixed with the air, (3) the cleanliness and (4) the effective distribution of the air.

Air Like a Sponge

Air, according to the men who have studied it, is just like a sponge. It is always trying to absorb as much water-vapor as it can hold. The difference between good and bad air, provided both are clean and free from impurities, is simply a matter of the water-vapor which is mixed with it.

The theory that to make air suitable for homes and manufacturing establishments was simply a matter of heating or cooling until the temperature was so-and-so has been found to be faulty. In fact temperature is less than half the requirement. The really important factor is humidity, or the amount of water-vapor which is mixed with the air.

The only difference between water and water-vapor is form. Water is a liquid and water-vapor is a gas. They are exactly the same except that we see water when it is a liquid, and it is invisible as a gas. A pound of water changed into or evaporated into water-vapor still weighs a pound, but the vapor may occupy many times the liquid.

Nature itself has provided a balance between water and water-vapor and air. If it had not the air would promptly go off on a joy ride, and absorbing all the water leave the populace to die in a barren desert. The two reasons why this cannot occur is heat, and the air itself.

Evaporation Data

The amount of heat it takes to evaporate a pound of water into a pound of water-vapor, even without raising the temperature of the vapor above that of the liquid is unbelievably great. In fact if the amount of heat necessary to evaporate a pound of water was converted into work it would lift a man weighing 150 pounds from the sea level to the top of a mountain 5,000 feet high.

It is the temperature of the air that regulates the quantity of water-vapor it will hold. Very hot air can hold many times the amount of water-vapor as very cold air, and at any given temperature we know exactly how much water-vapor the air can hold if it is fully saturated. Thus the whole theory and practice of "manufactured weather" is based upon the peculiar balance which nature has provided.

It has been discovered that in manufacturing establishments where the "weather man" is installed, the work turned out is better, the condition of the men employed is better and there is little loss in labor from sickness. One example of the work turned out under such conditions is the NC 4, the sea-plane which successfully achieved the first Trans-Atlantic flight.

The three planes which jumped off for this remarkable journey, the NC 1, the NC 3 and the NC4, were alike in every respect save one. Their equipment, their engines and their crews were as nearly alike as it is possible to produce a given thing. But the NC 4 was the only one that completed the flight, and the difference between the NC 4 and the other planes was that the NC 4 was built under "manufactured weather" conditions at the Naval Air Craft factory, League Island, Philadelphia.

TELEPHONE-BARCLAY-1433 CABLE ADDRESS-"METEORPROD"

METEOR CHEMICALS

METEOR PRODUCTS CO. INC.

METEOR CHEMICALS

Importers Exporters & Manufacturer's Agents

SIXTY-SIX W. BROADWAY NEW YORK CITY

IT IS EASY

to place an order for Chemicals, Dyestuffs and Intermediates, but it is another matter to get real service on deliveries. Meteor Products Co., Inc., does all that can be done to make prompt delivery. Our record shows hard work backed by a "live" organization which has made CUSTOMERS our FRIENDS.

Place your next order with us and see what American enterprise and push represented by Meteor Service will really do for your business.

OFFERINGS

Formaldehyde, 40° Vol., U.S.P.
Spot or Future

Yellow Prussiate of Soda
Spot or Future

Sodium Nitrite, 96-98%
Spot or Future

Bichromate of Soda
Spot or Future

Tartaric Acid, U.S.P.
Spot

Quinine Sulphate, U.S.P.
Spot

OFFERINGS

Paranitraniline 145-7 M.P.
Spot or Future

Beta Naphthol, Technical
Future

Aniline Oil, Pure
Spot or Future

Aniline Salts
Spot or Future

Sodium Sulphide
Fused 60°-62°
Spot

Citric Acid, U.S.P.
Spot

Bringing the Food to the Table*

By RUMSEY W. SCOTT,

Vice-President Technical Advisory Corporation.

Every one of you gentlemen can no doubt recollect that when a school boy there was in your class a husky, overgrown youngster who "lorded it over" the other boys, and if any of you protested against his domineering attitude on any matter he would say, "Well, if you don't like it you can lump it." And is it not true today that while we may protest against the cost of food at hotels, restaurants, markets or stores, we stand like brow-beaten children before the bully who as much as says, "If you don't like it you can lump it."

I hold no brief for the profiteer in the supplying of foodstuffs, for he should be excoriated. Senator Harding recently said in addressing the farmers at the Minnesota State Fair when speaking of the unnecessary middlemen, "The parasite in distribution who preys upon both producer and consumer must no longer sap the vitality of this fundamental life." I sympathize, however, with the majority of those who produce and sell to us our foodstuffs, for while they individually may strive toward honest dealing and full measure, they are contaminated by a few "rotten apples in the barrel," and are parties to an economic system that has grown into a monster that is gnawing into the vitals of the body of the public. Uncle Sam recognizes that his ward, the public, has been long suffering, and has had the patience of Job, but there are many indications that his "dander is up," and he is determined to find out the cause of the acute indigestion and see if a little pepsin or calomel may not relieve his patient, and then find the remedies that will effect a cure.

Contribution of the Chemist

All chemists are familiar with the benefits that have resulted from the excellent work of the Bureau of Chemistry and the Bureau of Animal Industry of the Department of Agriculture and of many State and city agencies. The contribution of the chemists in soil improvement through the development of artificial fertilizers, in the preservation of foodstuffs, in the setting of standards of food purity, in finding palatable substitutes, and in the utilization of by-products, has been one of the most valuable that has been made in the production of foodstuffs. The opportunity of further advancement through the efforts of the industrial chemist is very great, and it is certain that his service will prove of inestimable value.

Civilization has brought to us great social advancement, but with it have come many greatly improved problems. For advancement to continue we must first be adequately fed, and our better standard of living requires greater per capita production, and in no field is this more true than in the production of foodstuffs. In the last generation there has been an exodus from the farm to the city workshop, and this has greatly curtailed farm production, and has complicated the distribution of the required food supply. The farmer who provides the bone and sinew of our national body politic supports our whole business structure. In order that we may live and prosper he is entitled to those things that will enhance his well-being and enable him to increase his output and reward his industry. His labor shortage must in some way be made up, and this can in no way be better accomplished than by the wide introduction of machinery. We must provide him with improved facilities for the transportation of his products. The population of this country could not be supported by our farm products today were it not for the invention and use of modern farm machinery.

The prosperity of our country has largely been due to the aid of the mechanical arm, both in production and distribution. It has been estimated that since the introduction of power and machinery in this country the productive capacity per man has been increased ten times. We today employ mechanical power to a greater extent than any other nation. The horsepower output is three times that of Great Britain. Our production per worker is 2.64 times as great, and the value of our output per wage-earner is 2.1 times that of Great Britain.

The concentration of a large percentage of our population in large towns and cities has made the problem of our food supply and distribution most complicated, and has greatly added to its cost. Not only is the city almost wholly dependent upon outside sources for its supply, but in farming as in business there has been a tendency toward specialization which has made the farmer dependent upon other sources of supply. The farmer now requires, and will more and more require, supplies and machinery from the industrial centers. Transportation, therefore, must provide the arteries through which the life blood of our people must flow, and there is no agency of commerce which requires more earnest thought and development than the free and economical flow of the products of labor

There is no element in our growth which has been so haphazard and wasteful as that of the food supply to our cities. Its inefficiency is daily exacting a tribute which we are staggering to support. This load has been borne patiently; but we are approaching the danger point. The pressure has nearly reached the point at which the safety valve is set.

The day of individualism has long since passed. We live in a time in which a social fabric has been woven having many fibers closely held together, tremendously complicated, not in a state of rest, but one of stress. Yet with it all there is a common purpose.

Other nations may be misled by the false light of communism, but our nation has built a back-fire that has arrested the conflagration—it is co-operation.

Common purpose, combined effort and resourcefulness will solve our economic problems as definitely as all other of our national problems have been solved, but we must not falter or hesitate. It is our problem. We must work together. We must find out causes and seek remedies.

The size of the job does not justify lethargy or inaction. The old structure is inadequate. Alterations and additions are necessary. While we have outgrown it we must still inhabit it. It cannot be demolished. Renovation is necessary. It must be made suitable for our present and future use.

Greater New York has become the largest city in the world; the greatest workshop; the financial center; yet if its food supply from outside sources were discontinued its population would approach starvation in three weeks. The people of New York spend for food alone $1,800,000,000 per year—a per capita expenditure of about 80 cents per day. The per capita expense for local carfares is approximately three cents per day. This gives some idea of the tremendous outlay for food. On the basis of a per capita protein consumption of 100 grams per day, the population of New York requires approximately 32,000 tons of nitrogen from food per year. Its population requires in heat units the equivalent of the coal burned in the largest power plant in a year.

New York is the greatest center of food consumption and distribution in the world, and draws its supply from nearly every State in the union and from many foreign countries. Yet its inefficient methods of distribution add tremendously to the production cost and exact a toll that is enormous.

In addition to the wastefulness and faulty distribution, the system permits a condition that has a most harmful influence upon production. The producer often sells to middlemen who are able to manipulate the market and force the producer to accept prices for his products that in many instances do not compensate for the cost of production. This discourages the farmer and results in a curtailed production the next season, and then the consumer is forced to pay higher prices.

Marketing must be free and unconstrained; it must be stabilized, and increased production must be stimulated.

Terminals Are Necessary

Proper facilities for the reception of foodstuffs must be provided. Fruits, vegetables and other perishable foods consigned to New York frequently are brought within a limited distance of their destination only to be tied up for days at a time on a railroad siding or at a terminal that is not adequate or is not provided with proper storage facilities. The delay in transit causes rapid deterioration of the food. It is often turned back to the producer or is, as has been frequently the case, dumped out of cars, meaning not only a total loss of the food, but requiring an unnecessary expense in disposing of the refuse. To cite a specific case, Two years ago in the winter the docks and wharves of New York and New Jersey received large consignments of vegetables from Florida and Cuba. They were brought to the railroad terminals in perfect condition and unloaded on unprotected docks and destroyed by frost. The shipments were refused and dealers were forced to employ dump carts from December till the following February to cart the frozen vegetables to the offal dock. As everyone knows, the terminal facilities at New York are totally inadequate. Storage space, especially cold storage, is inadequate. The wastage greatly adds to the cost of the food consumed, and often does untold damage to the producer. At the present time many producers of apples in the State of New York and elsewhere are forced to sell them at approximately one cent a pound, which brought two to three cents at wholesale.

In addition to the faulty distribution of our food supply the present system causes the supply to pass through too many unnecessary hands, each involving a physical handling which is expensive and a profit which would be unnecessary if more direct methods of distribution obtained.

In the report of the New York State Food Investigating Commission made in 1912 it is stated that the producer at that time received only about 40 per cent. of the retail price.

The formation of producers' co-operative associations has resulted in many benefits to the producers. These associations will in due course devise ways and means of providing facilities which are now so necessary to the producers for the sale and distribution of their products. They will assist in the procurement of funds for the purchase of additional machinery, equipment and supplies, and will arrange for loans on foodstuffs awaiting a market.

One of the greatest needs is to effect the proper co-ordination of all means of transportation. Transportation centers to serve as points of accumulation and transfer should be developed from which will radiate automobile routes, trolley lines and railroads. It will also be necessary at the junction points to provide suitable warehouses with cold storage facilities. These warehouses should be modern in design and construction. They should be provided with machinery for the quick and economical transfer of commodities from the cars to the warehouses and also from one form of carrier to another. The warehouses will serve as reservoirs for the accumulation of products awaiting distribution. At these junctions or transfer points there should be provided packing, preserving and canning establishments in direct connection with the railways. The junction points referred to, already to a large extent exist; but at these towns, and especially the smaller ones, there is no direct interconnection between the various lines of transportation, and they are almost wholly without storage facilities. There has been a mushroom growth without reference to the interrelation of facilities.

The concentration of shipments promotes heavier car loading, and wherever possible full carload shipments should be made. There is little or no profit to the railroad in carrying less than carload freight. Nor is there profit in the passenger business. The increase in earnings which will result from heavier car loading and increased mileage of cars will enable the railroad to provide the terminal facilities which are so urgently needed.

If a producer ships his produce to New York for sale he should be assured that his product will find ready sale and that it will reach the market in the least time, and in as good condition as when it left him. Also that it passes through as few hands as possible with the smallest number of handlings. If immediate sale is not made cold or ordinary storage space should be available so that the goods may be held until a favorable sale is made.

Inadequate Port Facilities

New York has entirely outgrown its port facilities. Not only are the people of New York but those of the entire country paying tribute on account of the high cost of handling freight within its limits. The Interstate Commerce Commission's investigations disclosed that the expenses of handling a car from the time it landed within the terminal limits of Jersey City until it was delivered to destination in Brooklyn or Manhattan, including lighterage, was approximately $35. At Chicago where there is no lighterage it was found that the cost of handling the same car within the terminal limits was $10.35. At Binghamton, N. Y., the cost was $1.80. A segregation of the line haul and of the terminal charge (which is being considered by the Interstate Commerce Commission), will, if made, operate to the decided disadvantage of New York as a port and will indicate the necessity of lowering the transportation cost within the New York district.

Various remedies have been suggested One would be to interconnect the railroads having terminals in New Jersey by a belt line railroad or some similar rail connection, and also to provide direct rail connection by tunnels or bridges with modern terminals in Manhattan, Brooklyn and the Bronx; thus eliminating the use of lighters and floats. This would do away with many of the railroad piers in New York and release them for the much needed dock space for shipping.

One of the cardinal principles of freight handling is to reduce as far as possible transferring and rehandling. It is desirable wherever possible to keep the goods in the same container from the point of origin to the point of destination. The loading of freight into box cars requires expensive manual labor. Standard containers of various sizes could be employed, and when loaded by the shippers at the starting point they may be placed by overhead hoists on motor trucks and taken to the railroad or to the warehouses. Similar hoists would place the containers on railroad flat cars and when the cars arrive at the railroad destination they would be transferred to motor trucks for immediate delivery to the consignee or placed in warehouses for storage. By this means manual handling is largely eliminated and, further, a quick transfer is made so as to release the freight car for useful service. The present practice of using cars for storage even for a short time greatly increases the cost and delays of railroad operation. The use of containers will also reduce pilfering and damage to goods in transit.

There is at present a commercial practice in handling foodstuffs at New York that is very wasteful in time and money. A producer in Pennsylvania sends his produce to New York for sale. It reaches the terminus of the railroad in Jersey City, is floated to Manhattan and placed on a pier. It is sold to another dealer in Philadelphia. The shipment has to be again floated back to Jersey City, and the car is then hauled to Philadelphia over the same line by which it came—a most uneconomical procedure. If the car were

*Paper read at the Sixth National Exposition Chemical Industries, September 22, 1920.

DISPLAY OF U. S. INDUSTRIAL ALCOHOL CO.

C. B. PETERS CO. INC.

15 MAIDEN LANE
NEW YORK

C. B. PETERS, Pres. ALFRED VARIAN, JR , Vice-Pres. L. PASTERNAK, Treas. LESTER W. HUBER, Sec'

Phone Cortlandt—5761
Cable Address—"Persvar"

Branches { SAN FRANCISCO
PHILADELPHIA

SPECIALISTS BROKERS
MANUFACTURER'S AGENTS

Acids

ACETIC
NITRIC
SULPHURIC

Drums

NEW—USED
BLACK–GALVANIZED
ALL SIZES

Glycerine

CRUDE
REFINED

Vegetable Oils

COCOANUT
SOYA BEAN
PEANUT
CHINA WOOD

Fertilizer Materials

NITRATE OF SODA
POTASH SALTS
SULPHATE OF AMMONIA
ACID PHOSPHATE, ETC.

Wood Flour

Quicksilver

Nitrogen Products

(Direct Shipments From Abroad)

NITRATE OF POTASH
NITRATE OF AMMONIA
BICARBONATE of AMMONIA
NITRITE OF SODA
SAL AMMONIAC
UREA

Sales Associates

THE DRAPER MFG. CO.
CLEVELAND, OHIO

JOHN C. HOORNBEEK'S SON
NAPANOCH, N. Y.

THE SHAWINIGAN PRODUCTS CORP
SHAWINIGAN FALLS, QUEBEC

held at Jersey City terminal and samples were placed on sale at a central auction salesroom only that which is sold for New York delivery would be floated across the river.

The City of New York is now planning the building of terminal markets in the Bronx, Manhattan and Brooklyn. They will be centrally located at the waterside and have piers so that ships may directly discharge their cargoes of foodstuffs, and railroad cars on floats may deliver their consignments. There will be built adjoining the piers warehouses for the storage of food and cold storage for meats and vegetables. There will also be provided auction rooms for the public sale of all goods consigned to the public market. Facilities will be provided for motor truck and dray delivery. There will be direct connection with the railroads entering the city. By this municipally provided means, producers can reach large consumers and retailers by the most direct route, and most of the rehandling will be avoided.

Improved Retailing Methods

In the last few years a number of retail establishments of the chain store type have been in operation, and through their ability to buy in quantity and distribute economically have been very successful. While the tendency is toward the development of large retail organizations it is doubtful if the small retail store will ever be supplanted. The overhead expense of the small retail store is usually low on account of the fact that the proprietor and members of his family serve customers. Many of the small retailers are now in associated or co-operative companies which buy many of their staples in quantity, and distribute from the co-operative warehouses according to immediate requirements. The retailers are kept posted on market conditions, and are given friendly counsel in accounting and merchandising methods.

The local delivery of the food supply by drays, wagons and trucks is a stupendous problem. The Commissioner of Markets of New York has made the following estimate of the costs of cartage:—Butter, $400,000 per year; eggs, $500,000; cheese, $120,000; poultry, $400,000; potatoes and vegetables, $10,000,000 per year.

It is not uncommon for trucks to wait in line at piers from 10 o'clock in the evening until five o'clock the following morning for their loads. At most of the steamship piers one frequently sees trucks strung out four or five blocks awaiting their turn. This condition is largely due to the fact that piers are used for storage, whereas they should be used only for the transfer of cargoes, and connected warehouses should be provided for storage.

Store-door delivery made by large, efficiently controlled trucking companies will greatly aid in reducing local delivery charges.

Economic necessity has developed the chain restaurant, and in the last five years there has been a consolidation of a number of the larger hotels into groups under a single operating head.

The wastage and losses in foodstuffs in hotels are so great that it becomes necessary that they be curtailed as far as possible. It is reported that one large New York hotel doing a food business of approximately $2,000,000 per year spends about $100,000 per year for accountants, auditors, food checkers and clerks in their food department. Even with their elaborate system of food control the losses through theft are considerable.

A very interesting new system of food control for hotels and restaurants has been developed, and machines have been perfected which, in the case of the large hotel referred to, would if employed effect a saving of approximately $90,000 per year. By the use of the several machines that are used for the purpose, the orders are printed, and the bills priced in a single operation by the waiter inserting the order card in a machine and turning a key. Simultaneously an electric signal gives notice to the cook what is wanted. For example, let it be a steak. When the waiter turns the key in machine No. 15 reserved for steak orders, he receives a metal slug bearing the number of the food ordered. The waiter takes the slug No. 15 to the cook who gives him the steak, and the cook receives the slug as a receipt for the steak. By further development of this mechanical system all pricing, checking and tabulating is done, and the proprietor or manager is given, at the end of the day, a complete balance sheet. This illustrates what may be accomplished by a careful analysis of requirements, and perfecting machines to eliminate labor, and organizing improved methods of operation.

The large meat packing establishments have not only perfected remarkably efficient agencies of distribution, but in manufacture they have built plants that are models of mechanical operation. In the larger packing houses various processes are arranged according to the successive steps of manufacture, and machinery of many types is employed to eliminate labor and increase production. As in the manufacture of automobiles the various processes are timed, and are so arranged in order, and so systematized that the product moves from process to process in a continuous stream. This system is called "progressive production." The greatest benefit from the use of machinery can only come from the careful study of the entire problem of manufacture, and organizing methods and processes, and further by employing the machine that is best adapted to that particular use.

The Fish Industry

Great advancement has been made in recent years in the fish industry. Large organizations have been formed which send out well-equipped ships and boats to make the catch. When the ship arrives at port it is docked at a modern terminal having mechanical facilities for promptly unloading and placing the fish in the plant or in cold storage. Sea food is the most perishable of all food products, and it must be handled scientifically and distributed promptly or there is enormous wastage.

Better methods of packing, curing and shipping are being perfected. Chemists, in co-operation with the Bureau of Fisheries, have discovered that fresh fish chilled by dripping sea water at a temperature just about freezing will keep for weeks without being iced. It has been stated recently that fish have been shipped by parcel post wrapped only in paper and burlap from Maine to California and have arrived at their destination in perfect condition.

Fish offal now yields many valuable by-products. Rectified oil, which is a pure, odorless, tasteless substance, is now made and is used as an ideal base for imitation butter. Fish meal is rich in protein and is now used as stock feed and has a market value of $100 per ton. Good grades of leather are made from fish skins, and offer another valuable source of supply, especially in view of the failing supply of leather from established sources.

The production and distribution of foodstuffs in size and importance transcends by far all other elements in business, and it has been possible for the speaker to refer to only a few of its phases. To increase production and lower the cost of distribution presents an enormous problem, but in view of the accomplishments of the chemist and the engineer in lending a hand to lifting the load that is now oppressing all peoples, we may safely look to science to materially assist in solving this great problem.

The chemist through soil enrichment has shown how to increase crops. He has given us artificial refrigeration and methods of food preservation. He has given us hundreds of by-products heretofore wasted. He has taught us the science of dietetics. He has improved methods of dehydration. He has developed new and palatable foods. He has

BOOTH OF THE GENERAL CHEMICAL COMPANY

Material Handling and Standard of Living

By ROY V. WRIGHT

Statistics of railway traffic reflects to a certain extent the fact that the standard of living in this country is steadily increasing. With the development toward higher wages and shorter working hours the average worker of today regards as necessities many things which were looked upon as luxuries not many years ago. These things must all be transported from the producer to the consumer. In 1896 the ten miles of revenue freight per inhabitant of this country amounted to 1.34. For the year ended June 30, 1916, or practically the last year before we entered the world war, this figure had increased to 3,370, or an advance of about 150 per cent. in 20 years.

Today we are facing an exceedingly serious situation in this country because of the labor shortage; it will be impossible to bring down the present high cost of living, and indeed it will continue to mount still higher, unless production can be increased. It is doubtful if there are many thoughtful workers who are not fully awake to the fact that restricting production, while it may increase their compensation temporarily, will in the end reach to the serious disadvantage of their fellow workers and themselves. The problem becomes, then, one of so improving the output of each worker that a sufficient amount of material may be produced to satisfy all of their needs and at as low a cost as possible. To accomplish this end some instrument must be devised which will conserve the energies of the worker and multiply his output.

A concrete example of possible accomplishments in this direction and how the general public—including the worker—will benefit thereby, is shown in the present railroad situation. Transportation facilities are inadequate and it is impossible to keep the factories supplied with raw materials or to transport all of the finished products or to distribute the food products, etc., which are concentrated in certain section of the country and upon which the people as a whole depend for their very existence. The railroad problem, however, is not one of moving the cars and locomotives over the rails at a higher rate, but rather providing such facilities as will enable the more prompt loading and unloading of the cars and the handling of equipment through the terminals. It is of interest in this connection to note that the shipper and the consumer have the cars 2.6 times as long as the railroad actually requires for hauling them. If, for instance, mechanical means can be provided to supplement the human factor and increase the average individual output, it will be possible to do this work much more quickly and thus relieve the congestion at the terminals and keep the equipment moving for a proportionately greater time each day. This, of course, will result in a corresponding increase in the average miles per day, and this at a time when the railroads are the limiting factor in the situation, will greatly help to decrease the cost of living. No one class will profit entirely from this improvement, but it will be spread over the entire population, rich and poor, laborer and capitalist.

This is only one example of hundreds of different ways in which material handling machinery may be used to advantage in inceasing production and therefore raising the standard of living, and thus not only adding to the general comfort of the community, but relieving many from actual want.

It is of vital importance that a campaign of education be promoted to get the people generally, and particularly the workers who must use the material handling machinery, to realize the benefits which will result to them and to the people at large.

Increasing Conduction and Reducing Fuel Consumption*

By W. R. VAN NORTWICK

Due to its scarcity and high price the problem of fuel conservation is today receiving more attention than at any time in the past. Great thought has been given to the development of the modern stoker so as to get every heat unit out of the fuel and into the furnace.

The ideal design of a steam generator would be one in which the fire could come in direct contact with the water—with no wall of metal between. Of course this is impossible, and we are compelled to interpose the wall of metal between the fire and the water. Great pains have been taken to reduce this wall to its smallest possible thickness with a maximum conductivity.

However, the very operation of the boiler tends to decrease the ability of the boiler to transmit the heat units from the fire to the water with a constant decrease in efficiency and increase in fuel consumption to accomplish a given result. This is due to the soot deposited on the tubes from the fire and the scale deposited from the water.

The fuel in burning produces a fine soot or ash which carried by the draft finds lodgment on the top of the tubes of a water tube boiler or in the flues of a fire tube boiler. It is strange that progressive engineers failed for so many years to realize that this soot (which is one of the best heat insulators known) retarded, more or less effectually, the transference of heat to the water. It is only of comparatively late years that any mechanism has been developed for mechanically blowing this soot from the tubes.

Mechanical Soot Blowers

It is true that the steam lance has been used in plants for some time, but this

*Paper read at the Sixth National Exposition of the Chemical Industries.

Genasco

Lubricants and Special Products

offer exceptional opportunities to manufacturers in certain lines of industry. Some of the leaders in the Genasco Line follow:

Lubricants

High grade oils for gasoline motors and special lubricating purposes.

For Paint and Varnish Trade

Light naphtha, turpentine substitute, and paint oil for varnishes, paints and japans.

For Ink Manufacturers

Solvents and bases for all kinds of ink.

For Drug Trade

Odorless, tasteless and colorless oils for pharmaceutical purposes.

For Mining Industry

Reagents for flotation of metallic and other ores.

Special Products

Special mineral oil products for special purposes.
Sulphate of ammonia of commercial grade.

Data concerning these and other products of the Genasco Line may be had on application to the

Barber Asphalt Paving Company

PHILADELPHIA

was used to partially blow the soot from the tubes when it had accumulated to such quantities as to interfere with the draft and tended to slow down the fire. The fact that there is only one insulator more efficient than soot had apparently escaped notice and the soot was allowed to remain on the tubes in sufficient quantities to cause a considerable fuel loss. Today, the use of the mechanical soot blower is becoming more common, although there are many boilers which are not so equipped.

The possible loss due to soot is indicated by a recent test run at the plant of one of the largest electric light companies in the country. Figures from a new and perfectly clean horizontal water tube boiler of 600 horsepower capacity showed the uptake temperatures to average 550 degrees on the first day and 650 degrees on the fifth. This increase of 100 degrees in only four days indicates an increased fuel consumption of about 5 per cent., due to failure to blow the soot from the tubes.

The removal of soot by mechanical methods is a comparatively simple task provided a properly resigned and installed soot blower is obtained.

However, the elimination of water scale in the same boiler is a much more complicated problem. This is due to the character of the substance as well as the location in the boiler in which it forms. This water scale is not only an excellent heat insulator, but is the cause of numerous, more or less serious, boiler failures. One of the large boiler insurance companies in New York reports that the large majority of their claims arise from burnt tubes, due to scale incrustations.

These scale incrustations are due to the presence, in the feed water, of foreign material carried either in suspension (as clay and fine vegetable or organic matter), or in solution—as the carbonates, sulphates and chlorides of the various earth salts.

In addition scale is often formed by the introduction into the boiler of oils or grease. This takes the form of lime soap, iron soap, etc. An indication of the amount of scale which may form, from these various causes, is found when it is realized that in 100 horsepower boiler during one month's operation 300 pounds of solid matter may be precipitated on the tubes from water containing only 7 grains per gallon, while with some spring waters 2,000 pounds may be deposited in the same period.

Cost of Boiler Scale

Many long and accurate tests have been made to determine the cost of the plant owner, as measured at the coal pile due to the accumulation of scale in the boiler. No hard and fast rule can be laid down as to these losses, due to the fact that the character of the incrustations vary with the different feed waters.

Professor Schmidt of the University of Illinois, from a series of tests with boiler tubes coated with scales of varying thickness up to one-eighth inch, draws the following conclusion: (1) Scale varying in thickness up to one-eighth inch causes a heat loss varying from insignificant amounts up to as much as 10 or 12 per cent.; (2) the loss increases somewhat with thickness of the scale; (3) the mechanical structure of the scale is of as much, or more, ducing this loss; (4) chemical composition, except in so far as it affects the structure of the scale, has no direct influence on its heat transmitting qualities.

Tables have been prepared by various interested parties showing that 1-16 inch of scale will increase the fuel consumption 15 per cent.. ¼ inch, 60 per cent., etc. This relation does not strictly hold. If the scale is hard and dense and practically waterproof it will doubtless be an effective heat insulator, while if it is porous, as many scales are, the water will be able to permeate the scale and, reaching the boiler metal, transmit the heat with comparatively small fuel loss.

One hundred and twenty tests made by the Illinois Central Railroad indicated an average increased efficiency, due to thoroughly cleaned tubes of 11 per cent. While E. M. Fiske states that as a result of tests made for three months previous to and three months after scale was removed from a boiler, it was found that the result, at the coal pile, was 10 per cent. in favor of the clean heating surface.

The Hartford Steam Boiler Inspection & Insurance Co. reports as the result of one year's inspection, 157,804 boiler defects, due to 22 causes. Of these, those due to deposits of scale or sediment numbered 41,026, or approximately 26 per cent.

Feed Water Treatments

While there are no theoretically perfect feed waters, various treatments have been developed with the idea of purifying the feed water so as to eliminate the scale incrustations. Let us examine these very briefly:—

Filtration.—These materials which are in suspension may often be filtered out by use of properly designed filters of sufficient capacity. Such material of this character as passes into the boiler may to a great extent be removed by the surface blow it off.

External Heat Treatment.—Where the principal scale forming material is the bicarbonate of lime, magnesium or iron, beneficial results may be obtained by means of the application of heat to a temperature above 212 degrees for periods of sufficient length to drive off the one particle of carbon dioxide leaving a mono carbonate which is insoluble in water and which is therefore precipitated and removed from the feed water.

Most waters, however, contain material other than the carbonates so that this treatment, which is expensive to instal and maintain, only partially removes the trouble, allowing the harder sulphates to be introduced into boiler.

Some waters carry salts which will not react to heat or other treatment and require to be evaporated and condensed. Even in cases of this kind sulphate of lime may make its presence known in the boiler. As shown in marine experience evaporation of sea water leaves scale forming material in the water.

External Chemical Treatment.—This treatment, being only partially effective, is subject to the same criticism as the heat treatment. It allows scale to be formed in the boiler and the high cost of installation, interest on this cost and the cost of maintenance is practically wasted.

Combined External Heat and Chemical Treatment.—This system of feed water treatment is the best system as yet developed for external treatment. If anything it may be criticized for being too efficient. In plants in which it has been installed it has been found necessary to introduce scale making material into the treated feed water to stop the pitting of the tubes. However, the principal objection to this system, from the viewpoint of all but the largest plants and wealthiest owners, is that its cost is prohibitive. For the average plant the cost of such an installation would at least equal the cost of the boilers, while the interest and maintenance costs could not be expected to be any lower.

Internal Chemical Treatment.—For many years the American power plant engineer has been buried under literature advocating the use of various "boiler compounds." The makers of practically all of them guarantee their product to successfully remove old scale and prevent the formation of new, regardless of local conditions. However, authorities are agreed that boiler compounds are not successful and should not be used.

Mechanical Scale Removal from the Boiler.—This then brings us down to the removal of the accumulated scale by mechanical methods. There is every reason to believe that the large power plants and central stations have adopted the most modern and economical practice in this portion of their boiler room procedure.

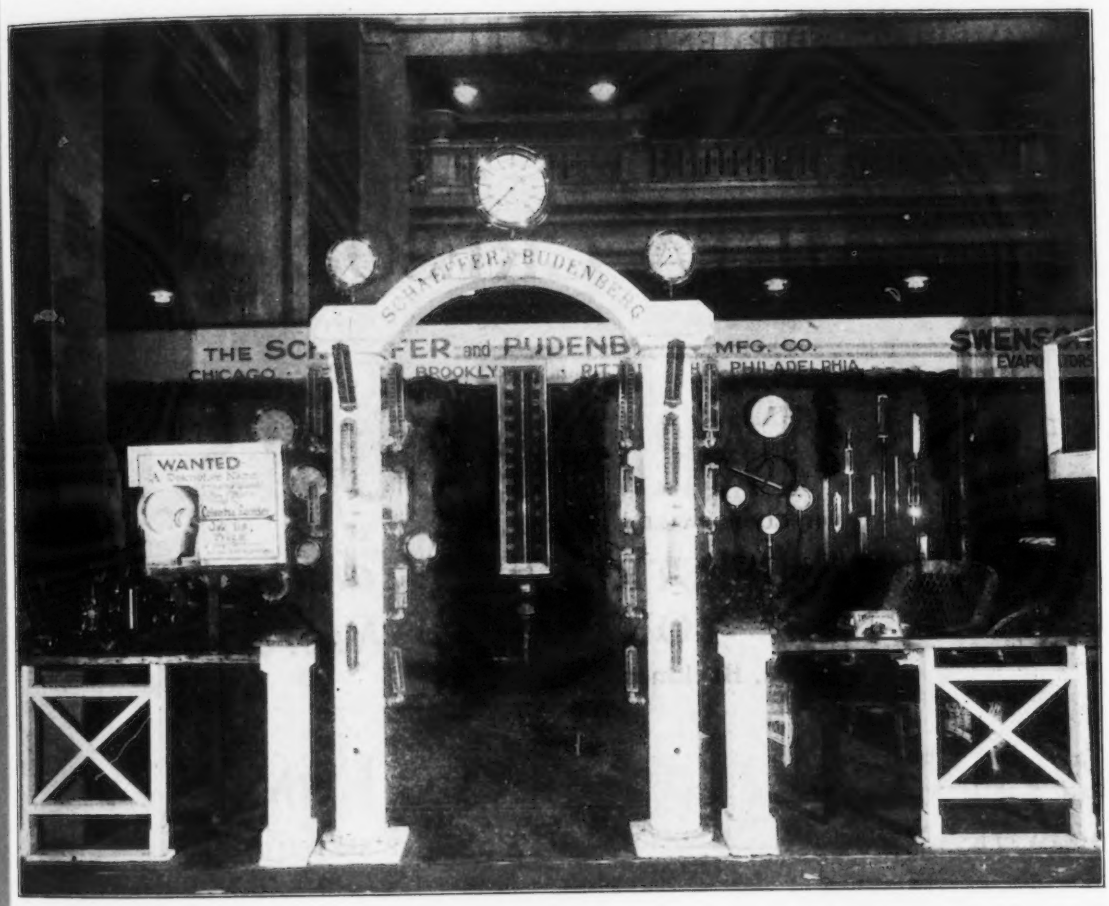
The dense, hard scale will form the most rapidly in that portion of the tube surface which is subjected to the highest temperatures of the gases. This portion of the boiler is naturally found in the lower four or five rows of tubes in the first pass.

The practice of the large central stations consists of the frequent cleaning of those bottom rows together with three or four of the upper rows at each time. In this way the entire boiler is cleaned at least twice a year while the lower rows are cleaned every 30 to 60 days.

The mechanical cleaner should be so designed and constructed as to thoroughly remove all the scale in the shortest possible time, at the lowest cost to operate and should require a medium of expense to maintain and repair, working with absolute safety to the boiler and operator.

These methods of driving mechanical cleaners present themselves, i. e., air, steam and water. Where the plant is equipped with compressed air in sufficient quantities and pressure, the air driven cleaner is preferable. Failing in this steam may be used. The majority of plants have water at sufficient pressure, either from the feed or fire pumps, to enable them to operate water driven machine if compressed air is not installed and the plant conditions prohibit the use of steam.

INTERESTING DISPLAY OF SCHAEFER & BUDENBERG



The Greeley Products Corp., of New York city, had, among other things, at its booth during the sixth annual exposition of chemical industries, held in New York city the last week, a disp'ay of a number of petroleum products of which it is agent. It was stated that it was the only exhibit of its kind at the show.

Fuel Saving in the Dressler Kiln*

By CONRAD DRESSLER

The saving of fuel in the Dressler kiln is one of its great advantages, but is by no means its greatest; and although I am only discussing this feature before you today, I should be sorry that you should think that it is on the score of fuel economy, great as it is, that our kiln has won its present position. For there is no positive advantage in saving fuel or labor, unless quality in the goods is maintained—and our principal purpose has been so to control the heat treatment of the goods which pass through our kilns that they shall receive exactly the amount of calories that they require, at exactly the rate which suits their particular needs and bathed in the atmosphere which gives the best results—furthermore, that they shall soak in that heat and atmosphere just as long as necessary and be cooled off at the rate which shall be most beneficial—in other words it is our pride that we establish a time and heat and atmosphere curve which is the ideal one for each material treated, and that we maintain this curve constant so that every article that passes through the particular kiln in which it has been set, receives the same treatment as every other. In this way we eliminate all the defects which arise from variations in heat treatment and what goods are defective after passing through our kiln owe their defects to other causes than that of the firing they have received. But it is a great additional advantage in these days of expensive fuel, to save manufacturers anywhere from 70 to 80 per cent. of it, and I now purpose to show why this is and how it is done.

Dressler Kiln Described

Let me first describe the Dressler kiln for those who are unacquainted with it. The kiln is in the form of a tunnel which may be anything from 100 to 300 feet long. The goods enter cold at one end and come out fired and cooled at the other. The heat is applied generally in the form of burning gas at a point about two-thirds of the tunnel's length from the mouth.

The gas does not burn among the goods but in two independent chambers, which run on either side of the goods track for the whole length of the heating up and firing zones. The burning gases travel in these chambers in the direction opposite to the goods and the products of combustion are taken off generally at a temperature not exceeding 400 degrees F. or 500 degrees F., they have therefore practically given off the whole of their available heat.

Incidentally the heat they give off in the kiln is not the radiant heat which would proceed from the walls of ordinary muffles. Owing to a system of gravity circulation between the double walls of the combustion chambers, the heat is conveyed to the goods in a stream of air, or other gas, as desired. This makes for a very perfect distribution of heat throughout them.

It is also one great form of fuel economy. In ordinary intermittent kilns or muffles the whole structure has to be heated up and cooled down with the goods, but in our kiln the structure remains permanently heated.

Our kiln is protected from radiation by a thick layer of Kieselguhr; this accounts for another important saving of fuel, not possible where kilns have to be cooled down to withdraw the goods.

After the goods have reached the hottest zone and have been completely fired, they pass through a cooling zone about one-third of the total length of the kiln. Here they meet a stream of cold air which is drawn through them and later into the combustion chambers. The heat which the air thus recuperates from the goods is utilized in lieu of that much fuel—for every calory abstracted from the burnt goods is a calory saved in the gas.

This is a very big saving, indeed. Theoretically, if exterior radiation could be entirely prevented and all the heat could be abstracted from the fired goods and imparted to the unfired goods only the calories needed for driving off water or producing chemical changes would have to be expended.

As a matter of fact the amount of fuel used is so small that only a portion of the air needed to cool the goods can be used, and therefore as much as 50 or 60 per cent. of the heat in the goods has to be removed in the form of additional hot air—otherwise they would come out too hot to be handled.

Here, then, are two more great sources of economy in fuel—the recuperation of heat in secondary air to burn the gas and the free gift of heated air for other purposes.

To the latter can be added a smaller quantity derived from cooling pipes which lie alongside the track and serve to keep the wheels and axles cool. The same fan will draw off the hot air from both sources.

But one of the greatest economics is due to the fact that we can and do burn the gases in the combustion chambers with just the right proportion of air. It is well known that in most kilns, even in the continuous Hoffman ring kiln, the excess of air varies between 8 and 10 times that, which is needed. This is necessary to produce the oxidyzing effect on the goods.

Our special chambers make the atmosphere in the kiln proper and in the chambers and independent the one of the other.

To sum up, the causes of fuel economy in the Dressler Kiln are due to:—

1—The kiln structure being constantly maintained at its top temperature thus avoiding the loss due to alternately heating up and cooling down.

2—The recuperation of heat from the goods and supports in the cooling zone of the tunnel and the utilization of superheated air for burning the fuel in the chambers.

*Paper read at the Sixth National Exposition of the Chemical Industries.

WILLIAM E. JORDAN, Inc.

IMPORTERS COAL TAR PRODUCTS EXPORTERS

Telephone Beekman 1758

11 CLIFF STREET, NEW YORK

Cable Address "DANJOR"

CRESYLIC ACID

ALL GRADES—SPOT, OR TO IMPORT

PHENOL SPOT GOODS IMMEDIATE SHIPMENT (*For Domestic Consumption*) CRESOL, U.S.P.

PARA CRESOL, 98-100%

META CRESOL, 96-100%

JORDAN COAL TAR PRODUCTS CO.

(INCORPORATED)

Importers Manufacturers

11 CLIFF STREET NEW YORK

Telephone, Beekman 1759

Manufacturers' Representatives

BLACK PAINT

For Iron or Woodwork

PITCH *and* TAR

For all purposes

CREOSOTE OIL up to 40% TAR ACIDS

For Flotation and Disinfecting Purposes

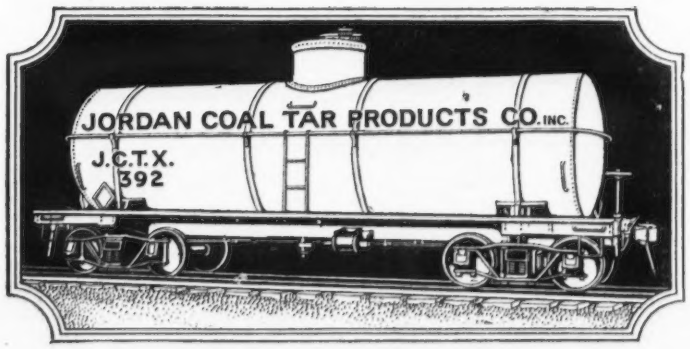
DEAD OIL
Disinfectant and Wood Preserving

SOLVENT NAPHTHA
Spot Goods

NAPHTHALINE
Crude and Flake

Works at

Matawan, N. J.
Brooklyn, N. Y.
Allentown, Pa.
Reading, Pa.



Representing

INTERNATIONAL COAL PRODUCTS CORPORATION

Works at

IRVINGTON, N. J.
CLINCHFIELD, VA.

3—The drawing off of the products of combustion at a very low temperature, not, as in intermittent kilns—at their maximum heat.

4—The correct proportioning of fuel and air, so as to produce perfect combustion.

5—The effective insulation of the kiln structure and reduction of radiation to a minimum.

By these means we are enabled to fire pottery goods to 1,900 degrees F. with a coal consumption of 51 per cent. of their weight and to 2,400 degrees F. with a consumption of 8 or 9 per cent.

Over and above these savings we present the manufacturer with an amount of heated air from the sources given above, amounting in value to about one-half of the total calories expended in firing the goods. Thus, if this heated air be taken into account, the fuel consumption is about cut in half and becomes respectively 2½ per cent. and 4 to 4½ per cent.

I cannot help thinking that our system of heat treatment must apply to many chemical industries. Our kilns have been used for making copper oxide and lead oxide. We have also designed kilns for the conversion of gypsum stone to plaster of Paris. Lately we have taken up the immensely interesting problem of coal carbonization which is a purely chemical problem.

But I hope to have an opportunity whilst here to learn in what way me may be able to help one another—we, by saving fuel and giving constant results—you, by supplying us with opportunities for extending our fields of operation.

TO REPORT ON MINERALS ABROAD

Geological Survey to Supply Data for American Mining Interests—Moroccan Phosphate

The Foreign Minerals Section of the U. S. Geological Survey, which was created for the purpose of collecting and supplying official information about the mineral resources of foreign countries, has inaugurated a new service which may be of great value to American mining interests contemplating exploitation of foreign mineral deposits. The government geologists in that office have started a series of reports to be issued from time to time on the extent and value of various minerals occurring outside of the United States.

James C. Martin, geologist engaged on this work, has recently prepared a report on the phosphate rock deposits in Morocco, in which he discusses the general conditions, location and geology of the deposits. Referring to the industry he says:—

France has a mild form of monopoly over the output in Tunis and Algeria and allocates a part of each year's output to other European countries in rough proportion to their estimated needs, taking in exchange other materials required for the manufacture of superphosphate, such as coal, pyrite and sulphur. In addition to her deposits of phosphate in Algeria and Tunis, France controls vast undeveloped deposits in Morocco. These deposits are said to be extremely rich, containing hundreds of millions of tons, worth billions of dollars to France and capable of furnishing considerable aid in rehabilitating her war-depleted treasury. If current reports concerning the high grade and great extent of these deposits are true, France will be in a dominant position in supplying Europe with phosphatic fertilizer.

Italy is more dependent than any other European country upon France for a sufficient supply of African phosphate, and was allowed in 1919 and 1920 355,000 tons, which was nearly 25 per cent. of the available supply, and yet only 59 per cent. of her requirements. Italy, however, is not without possible sources of crude phosphate in Tripoli, and in the event of a long-continued shortage of this commodity she would doubtless explore and exploit her resources there.

METHYL CHLORIDE SHOWN AT SHOW

Roessler & Hasslacher Exhibits Chemical Now Made Here on Commercial Scale

The Roessler & Hasslacher Chemical Co. exhibited at the chemical exposition a chemical made on a large scale for the first time in this country—methyl chloride. As sold, methyl chloride is a liquefied vapor, non-poisonous and non-corrosive, which is finding application to a rapidly increasing extent in the refrigerating field, in the dye industry, and in the manufaeture of pure methyl alcohol.

It was discovered in 1835 by Dumas and Peligot and has been manufactured in Europe to a considerable extent since about 1875.

It is, however, only recently, and as a result of new process developed by the company, in which chlorine and natural gas are used as raw materials, that methyl chloride has been manufactured on a commercial scale in the United States and has become available at a moderate price.

As methyl chloride is one of the simplest substances in organic chemistry and is closely related to many industrial products, it is expected to come into extensive use in commercial manufacturing.

Hitherto, methyl chloride has been manufactured by one of two methods, namely by heating trimethylamine obtained from beet sugar residues or by the action of hydrochloric acid on methyl alcohol. The latter method, which has been largely used, has the disadvantage that the product obtained usually contains a considerable amount of the impurity, methyl ether, which since it boils at exactly the same temperature as methyl chloride cannot be successfully removed by distillation.

Methyl chloride is a vapor at ordinary pressure and temperature, which at atmospheric pressure may be condensed to about 24 degrees C (11 degrees F) or by compressing the gas to about sixty pounds gauge it can be liquefied at the ordinary room temperature. It is non-corrosive to metals and non-irritating when breathed, having an odor resembling chloroform but less sweet.

It is only feebly inflammable, differing in this respect from ethyl chloride, which burns more readily. Methyl chloride freezes at a low temperature (—103 degrees C equals 154 degrees F), and has a specific gravity slightly less than that of water.

One of the chief uses of methyl chloride is for refrigeration. It is as safe to use and as non-corrosive to metals as carbon dioxide, while having a head pressure which is lower than even that of ammonia, and operating at an efficiency equal to that of ammonia. The peculiar field of methyl chloride is in household refrigeration and in restaurants and small industrial installations where it is desired to avoid having an engineer to operate the ice machine, and in marine refrigeration. In the last instance ammonia is not permitted on account of the danger of using this refrigerant in the confined space on shipboard, while carbon dioxide, which is quite largely used in marine refrigeration, has the great drawback of very low efficiency in tropical water (which is just where the demand on the installation is greatest).

A second important use for methyl chloride is as a methylating agent, in the use of which it has great advantages over methyl alcohol.

Another suggested use of methyl chloride is that of a general anaesthetic, for which it appears to have properties resembling that of nitrous oxide.

It is also used as a local anaesthetic, e. g., in skin operations; as an extracting agent for volatile essential oils and perfumes; as a liquid for filling low pressure vapor tension thermometers.

COMMERCIAL SOLVENTS CORP. BOOTH

DISPLAY OF STEIN, HALL & CO.

Refractory Cement Life Insurance*

By F. W. REISMAN.

It is esteemed a privilege to address you this afternoon, but the brief time allotted to me permits only touching the high spots of the many uses for varied types of metallurgical and other furnaces where plastic high temperature cement now replaces the use of fire-clay.

Plastic high temperature cement costs more than fire-clay. There must be, therefore, good reasons, you will all agree, to warrant expending a greater amount when the difference is considered between the costs of fire-clay and high temperature cement; and the question naturally presents itself, "What insurance is there for paying the difference?"

"The chain is no stronger than its weakest link." The wall, in the combustion chamber, is no stronger than its joint. The joint made up of fire-clay cannot be called strong for the reason that fire-clay possesses no bond. It will disintegrate, crumble, and fall out of the joint, leaving crevices, into which gases will enter, which, together with the abrasive action, will soon tell on the fire-brick, resulting in the weakened wall beginning to bulge out, and finally after a comparatively short life finds itself ready to drop in the bottom of the furnace. It is obvious, therefore, that the greatest efficiency of the fire-brick has not obtained.

This shortened life can be extended and the greatest efficiency obtained from the brick by the use of plastic high temperature cement, when properly applied.

High Temperature Cement

The wall laid in fire-clay lasting three months can be made to stand up for one and a half years by the use of high temperature cement. Does that not make the use of fire-clay an expensive proposition, not only from the standpoint of cost of material, but also in the item of labor cost, important in normal times and much more so today?

We advocate laying fire-brick practically in brick to brick joints, buttering

* Paper read at Sixth National Exposition of the Chemical Industries.

Dyestuffs
Hematines
Logwoods
Hydrosulphites
ULTRAMARINES

SOLE IMPORTERS FOR

DESTREE & COMPANY

BELGIUM

HIGHEST GRADES FOR ALL PURPOSES

A Full Range of Direct, Acid, Basic, Chrome and Su'phur Colors

Our extensive experience enable us to take care of all inquiries for either Import or Exports

The Lazard-Godchaux Co.

of America, Inc.

100 William Street
New York City

Telephone, Beekman 1304 5 6
Cable Address "Anilaza"

TRADE MARK REGISTERED

OFFICES

SHANGHAI—15 Ave. Edward VII.
VIEUX CONDE
PARIS—Rue St. Lazare
MANCHESTER—Prudential Buildings
BRUSSELS 60 Rue de Merode
MILAN—45 Via Alessandro Manzoni
LONDON—422 Strand
LYONS—11 Rue de Castries

TRADE MARK REGISTERED

them with a thin batter made of one part water and six parts of the cement. After the setting is laid, it is well to wash over the entire face of the lining with two coats of diluted cement; the first coat being of a consistency like whitewash, and the second coat immediately applied after the first, with a consistency the same as used in laying the brick. This insures an airtight wall, and, gentlemen, you will all appreciate what this means. I intend to show you in a few months by slides the comparison between thick and thin joints. I also have with me several plates showing the merits of plastic high temperature cement, as well as its uses in various ways, and as these plates are shown description will be made as we go along for various types of furnaces.

The old saying that "A man is known by the company he keeps" is equally applicable to the manufacturer; for his prestige is obtained through the character and reputation of those who use his product.

I could start in New England, taking you to the cotton and woolen industries, where plants having fifty and more furnaces each, use plastic high temperature cement in preference to fire-clay; go along the lakes, where we find steel mills and oil refineries, packing houses and automobile manufacturers, wend our way to downtown New York, showing you central plants where, as you know, in all these instances accurate data is kept of costs in up-keep and where in these instances they have forgotten about fire-clay; go to the steel mills of Pittsburgh and Birmingham, the sugar refineries in Louisiana, the oil refineries of Texas and Oklahoma, the foundries of Missouri, the smelters of Utah and Montana, the varied industrial plants in California, the lumber mills of Oregon, and Washington, and British Columbia, where sawdust is so plentiful and is used as a fuel, causing heavy duty on the firewall, and continue on through the steel mills, gas plants and central stations of Canada, and all between these points stretched over this vast area are sandwiched glass works, electric power plants, gas works, having either coke-oven, water gas, or retort types, and everywhere we find "the kind of company we keep," having made satisfied friends by giving them longer life in the furnaces through the use of high temperature cement.

We are reaching out beyond these limitations and life insurance of furnace walls is now being realized by the agency of high temperature cement in far off Japan and Italy, France and Belgium are today becoming acquainted with its merits.

VIEW OF THE SOLVAY CO.'S BOOTH

UNITED STATES DYE MAKERS EXPECT EARLY PASSAGE OF PROTECTIVE LAWS

Bill Now Pending Will Be Submitted to Senate at the December Session—Consumers in Favor

The Committee of Dye Legislation which recently made its report to the American Dye Institute at a meeting held in New London, Conn., believes that the U. S. Senate at its meeting in December will pass the bill protecting the manufacturers of dyestuffs in this country. The report dealt with the progress of the legislation through the House and the Senate Finance Committee, where an embargo plan was substituted for the licensing plan of the House bill. The report follows:—

Immediately upon the report of the bill it became the object of persistent criticism and attack from its opponents.

It would be useless at this time to review in detail the objections urged by the opponents of the Senate bill. Your committee and its counsel were constantly available to anayze from both the manufacturing and legal viewpoint the numerous proposals to amend the bill. Save in a few instances, the opposition to the legislation was from the importers, who obviously wanted the fullest possible chance to import foreign dyes with which to undersell the American producer, or from that minority of consumers more concerned with an immediate competitive market in dyes than with the establishment of a thoroughly independent and self-sustaining dye industry in the United States. It is fair to say in this connection that there were a few instances where constructive suggestions for changes came from consumers who are in sympathy with the proposed legislation.

Your committee in presenting the case for the American dye industry to the committees of the House of Representatives and the Senate proceeded upon the openly declared idea that the testimony of impartial witnesses at the hearings would abundantly establish the fact that an American dye and related coal tar chemical industry is absolutely essential to the national defense and national welfare, and that the existence of high tariff duties on foreign dyes and intermediates is not by any means enough to protect such an industry in the United States from destruction through foreign commercial attack during the temporary period when it is developing complete production for the country. In other words, your committee proceeded upon the frank theory that a practical embargo against foreign dyes of the same kind and quality as those being produced commercially in the United States is a conceded necessary until our industry is fully developed.

You are familiar with the testimony at the hearings and of course know that it was established by the statements of military experts and chemists who have no connection with the dye manufacturers that a complete and self-sustaining dye and coal tar chemical industry in the United States is a vital necessity for our national defense, national health and general industrial welfare. The completeness with which that truth was brought out is, we are entitled to believe, evidenced by the passage of the bill in the House of Representatives by a substantial majority and by the favorable report of the amended Senate bill by the Finance Committee.

Notwithstanding the pressure of legislative business in the Senate and the pendency of the Peace Treaty as a continual problem, the Senate by a very substantial majority vote took up the dyes bill for consideration with a view to its passage. With the urgent necessity for providing the necessary appropriations to operate the government for the current fiscal year supplementing the Peace Treaty situation, those opposed to the legislation in the form in which it was reported by the Senate committee were able to occupy a sufficient amount of time of the Senate, under existing rules, to make those in charge of the bill appreciate the impossibility of attempting to press the measure for passage.

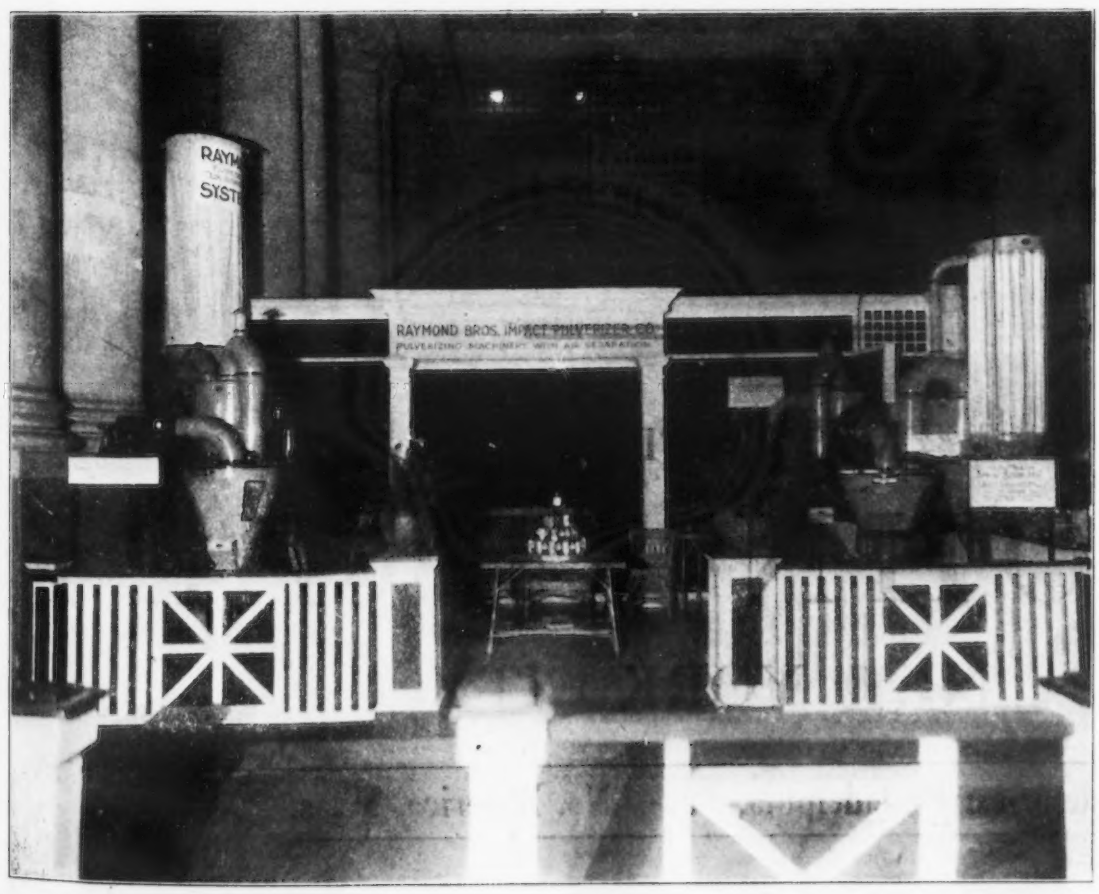
At the same time your committee is glad to be able to report that apparently a decided majority of the members of the Senate favor the passage of legislation to protect the American dye industry on the general plan embodied in the pending bill. The essential character of the industry as related to the national defense and national health seems to have been generally accepted, the vote for consideration above referred to clearly justifying such assertion by your committee.

The great majority of the dye consumers of the country have been vigorously supporting the proposed legislation. These consumers have appreciated that both the original "license system" proposed by the manufacturers and adopted by the House and in the "qualified embargo" plan substituted by the Senate committee, adequate provision was made for the consumers to secure from time to time all varieties of dyes not yet made in this country, while at the same time the general importation of foreign dyes to injure or destroy the American producers may be effectively prevented.

The attitude of your committee has been—and in that it knows it has expressed the view of the dye industry—that the consumer must be given ample opportunity to have as full a variety of colors as the consumers of other countries. Co-operation between the manufacturer and the consumer is essential in the dye industry and it is the committee's view that a continuance of the recent co-operation may be looked to from the consumers who have heretofore supported the legislation necessary to develop our industry.

The adjournment of Congress on June 5 last did not operate to defeat the pending bill. It retains its status as a bill passed by the House of Representatives, reported with amendments by the Senate Finance Committee and on the Senate calendar for consideration. In other words it may be called up for final passage in the Senate at any time in the session of Congress beginning on the first Monday of December next.

RAYMOND BROS. IMPACT PULVERIZER CO. BOOTH



Reducing Conduction and Radiation Heat Loss*

By S. L. BARNES

In view of the attention that has been given to the insulation of steam lines, feed water heaters and kindred apparatus, it seems strange that in years gone by so little effort has been made to reduce the loss of heat by conduction and radiation from boiler settings, furnaces, ovens, kilns, oil stills, etc. This apparent neglect has probably been due to three causes:—First, the cheapness and abundance of fuel; second, the general underestimation of the magnitude of the heat losses; third, the lack of a material which would meet successfully the requirements of an insulator for high temperature equipment.

During the last few years, however, rapidly increasing prices and the scarcity of fuels of all kinds have focused the attention of engineers upon the necessity for utilizing, in so far as possible, all of the heat generated in high temperature equipment. As a result of the investigations which ensued, it has been discovered that although it is impossible to eliminate entirely the passage of heat through walls, arches, bottoms and doors, even a sizable reduction effects fuel savings that are well worth while. It has also been demonstrated that the reduction of this great loss (commonly called "radiation loss") results in other important advantages, such as increasing the capacity of the equipment with no increase in fuel consumption; making temperatures more constant and uniform throughout the apparatus; decreasing the time required to bring equipment to working temperature; lengthening the life of the refractories by eliminating the necessity for overheating in the combustion zone; and providing much more comfortable working conditions for operatives by reducing temperatures around furnaces, boiler settings, ovens and the like—a big and important item in itself.

Having been engaged for a number of years in the manufacture of pipe and boiler coverings and insulating materials

*Paper read at Sixth National Exposition of the Chemical Industries.

NEW YORK COLOR & CHEMICAL CO.

Manufacturers of Colors

for Textiles
Lakes
Inks
Paper
Leather, Etc.

Specialties for all lines

MAIN OFFICE:

98 JOHN STREET

NEW YORK CITY

Factories: Philadelphia, Pa. — No. Billerica. Mass.

for cold storage purposes, it is only logical that the company which I represent should turn its attention to the development of insulation for high temperature equipment. In 1913 it began to produce a so-called insulating brick which had been used extensively in Europe for some years previously, and which seemed to combine all of the necessary characteristics.

Composition of Brick

These brick are composed principally of diatomaceous earth (kieselguhr). This substance is practically pure silica in cellular form, consisting of myriads of minute shells or skeletons of marine plants, known as diatoms, which existed ages ago in the waters that then covered the earth. When death ensued, the organic matter decayed and was dissolved by the water, the insoluble shells of silica sinking to the bottom. In the course of thousands of years, great deposits of these tiny shells were formed, many of which are found today high and dry above the sea. Some of the beds are hundreds of feet thick, and the white chalklike material of which they are composed is called, appropriately, diatomaceous earth.

The shells of these diatoms are quite small, so small in fact that it has been estimated that it takes approximately 39,000,000,000 of them to fill one cubic inch of space. Each shell is hollow and contains air, but since this air is broken up into such minute particle, no circulation can take place, making diatomaceous earth an excellent nonconductor of heat.

To increase the heat insulating efficiency of the natural earth, however, and to obtain a more uniform product, the raw material is pulverized mixed with finely ground cork, molded into brick form, and then fired. The cork is burnt out, and the small spaces left, being filled with air, increase the heat insulating efficiency of the finished product. The manufcturing process also eliminates the strata or layers, found in the natural earth and thus gives the brick uniform strength in all directions under compression.

Brick Non-Conducting

From the foregoing it may be easily understood why the insulating brick are such excellent nonconductors of heat, containing as they do, a high percentage of "dead" or entrapped air—the most efficient insulating medium that can be had if a vacuum, which is commercially impractiable on a large scale, be left out of consideration. Compared with fire brick or ordinary red brick, the two materials commonly used in the construction of high temperature equipment, it has been found that insulating brick of the type here described are fully ten times more efficient as nonconductors of heat. In other words, only one-tenth of the heat transmitted through a given thickness of ordinary brick would pass through the same thickness of these insulating brick. Therefore, one 4½-inch course of the insulating brick would retain as much heat inside the furnace, boiler setting or kiln as would 45 inches of fire brick or common brick.

The heat transmission through the brick under discussion has been determined by comprehensive tests run in the company's heat transmission testing station at Beaver Falls, Pa. These tests extended over a considerable period of time.

It was found that the transmission of heat through Nonpareil brick ranges from 0.647 B. T. U. per square foot per one-inch thickness per degree F. difference in temperature per hour at 300 degrees F. to 0.995 B. T. U. at 1,500 dgrees F.

The average transmission through insulating brick for differences in temperature of 500 degrees to 1,500 degrees F., is .845 B. T. U. and since it is 10.72 B. T. U. for fire brick, it appears, therefore, that the insulating brick are in reality 12.7 times better nonconductors of heat than fire brick.

The material is more than just a good nonconductor of heat, however. It combines other characteristics which make it suitable for high temperature insulation. In the first place, tests to determine the shrinkage and melting points made by Professor Edward Orton of Ohio State University and those conducted by the Bureau of Standards at Washington, show that the insulating brick will withstand safely temperatures up to 1,650 degrees F. Experience has shown that this heat resistence is ample if the brick are properly installed and protected with sufficient and refractory material, since insulating brick are not refractory and must not be used as such.

The ultimate crushing strength of the brick is about 140 pounds per square inch, which apparently is all that is required of a material of this kind. It would be a comparatively simple matter to increase the crushing strength, but since the heat conductivity varies inversely as the density, the aim has been to strike a happy medium. Furthermore, light weight is a distinct advantage when it is desired to install insulated equipment on the upper floors of buildings.

The problem of utilizing insulating brick in various types of high temperature equipment has been comparatively simple. Being in brick form, the material can be substituted for a like quantity of fire brick or red brick in the walls, arches, bottoms and doors of the structures it is desired to insulate.

Some Fuel Savings

Now let us consider fuel savings that result from the use of insulating brick in various kinds of equipment. Strange as it may seem, the securing of accurate figures has been an almost impossible task. In the first place, during the last three or four years most plants have been so overcrowded with business that the operating departments have found it impossible to run comprehensive tests. In the second place, the insulated equipment has usually been of different size and design from the old uninsulated equipment. Hence it has not been feasible to compare their fuel consumptions for the purpose of estimating the value of the insulation.

Theoretically, one 4½-inch course of insulating brick will save from 60 to 75 per cent. of the heat ordinarily lost by radiation from the average boiler setting, furnace, etc., and such information as has been secured from users of the material shows these figures to be substantially correct and quite conservative.

For instance, C. A. Eastwood, Superintendent of Station A, Pacific Gas & Electric Co., San Francisco, made an experiment to determine how much fuel could be saved by the use of insulation on boiler settings. He selected a 560 H. P. B. & W. boiler, the steam drums of which were covered with one course of common brick. A rectangular can, containing a measured quantity of water, was placed on top of one drum, and the boiler run at its rated capacity for a period of three days. During this time the rise in temperature of the water was carefully noted, and with these data it was a comparatively easy matter to determine, first, the amount of heat radiated per square foot of surface per hour; second, the amount of heat radiated from the total exposed area of the drums; and, third, the quantity of fuel which was being burned to make up for this loss. The figures obtained show that the loss totaled 390 barrels of oil per year.

A layer of insulating brick was then placed on top of the common brick and readings were taken as in the preceding test. The results show that the loss of heat with the insulating brick in place amounted to only 144 barrels of oil per year—a saving of 246 barrels or 63 per cent.

The Shawnee Gas & Electric Co., Shawnee, Okla., report that in one of their plants they have three boilers of the same size and type, two of which are insulated, the third being constructed with an ordinary setting. According to their statement, either one of the insulated boilers together with the uninsulated boiler will not carry the load, but the two insulated boilers will carry it with no trouble at all.

Another gas concern, the Iowa Gas & Electric Co., at Mount Pleasant, Iowa, insulated two benches of six retorts each in 1915, with one 4½-inch course of insulating brick in all four walls and over the arch. According to the president of this company, the insulation has resulted in the saving of 700 pounds of Illinois coal per bench per day. At the time these figures were given, coal was costing them $4.80 per ton, which amounted to a total net saving per year of $604.80 per bench.

The Link Belt Co. at Indianapolis have a number of malleable iron annealing furnaces, one of which has an insulated arch and side walls. The operating records of this company show that an average of 50.7 hours is required to bring this furnace up to the desired temperature of 1500 degrees, while the uninsulated furnaces require an average of 66.5 hours to reach the same point. Hence, the saving in favor of the insulation amounts to approximately 15.8 hours per heat, which is undoubtedly due to the big reduction in the conduction of radiation loss.

Brick in Blast Furnaces

In blast furnace stoves insulating brick have proved their value both because of the fuel they save and the increase in production effected. Figures supplied by the Zenith Furnace Co. at Duluth, Minn., show that the temperature drop in the blast after the insulated stoves had been on the furnace for one hour is approximately 50 degrees C., whereas the average drop in temperature obtained in good furnace practice with uninsulated stoves is about 100 degrees C. This is quite a big factor, since the higher the average blast temperature, the more iron can be produced.

It will be seen, therefore, that such figures as are available tend to confirm the theoretical saving of 60 to 70 per cent. of the heat lost by radiation and conduction from uninsulated equipment. That loss, of course, varies somewhat with different apparatus and under varying conditions. But in any case it is large enough so that a saving of 60 per cent., 50 per cent., or even less, is a very important economy, in addition to the improved conditions, as previously noted, brought about by confing heat to the inside of the furnaces. It may safely be stated that the fuel saving effected is sufficient, under average conditions, to repay the entire cost of the brick in less than a year—a very handsome investment return.

DISPLAY OF ANILINE DYES AND CHEMICALS

BOOTH FEATURED DYE PROGRESS

National Aniline Exhibit Displayed Variety of American Made Colors

An unusual color exhibit at the Chemical Exposition was that of the National Aniline & Chemical Co., Inc., which had a comprehensive display of dyes and intermediates of its own manufacture.

The whole intent of the display was to demonstrate the fact that an American dyestuff industry has been established and that the color needs of every man, woman and child may be supplied from American sources of a brilliance and quality which admit of no superior. Lifelike figures, imported from France and costumed in the latest modes by New York's leading designers, were artistically grouped upon a piazza of a country house.

The man, women and children of the exhibit were socially engaged and surrounded by an atmosphere of richness and refinement. The left hand and right hand sections were composed of exhibits of dyestuffs and intermediates in artistic arrangement, all co-ordinated with an architectural and mural motif of great beauty.

The exhibit was prepared with the cooperation of skilled designers, textile printers and colorists in every field of color application in American manufacturing establishments using National dyes in the perfecting of their products. It was a work of art. (A photograph of the booth is reproduced elsewhere in this section).

On the right and left were mural paintings of the chemical and dye-making plants of the company at Buffalo, N. Y., and Marcus Hook, Pa. In front of these paintings were artistically arranged pyramids showing in globular glass bottles the products of these factories; on the one side the coal tar intermediates, and on the other the finished dyestuffs, as they are offered by the company for sale. Other technical features displayed in these sections, of interest to the various color using industries, showed the wide range of the activities of the company and the progress made in the past four years in the establishment of a national dyestuff industry.

The center portion of the exhibit showed the veranda of a summer home. The occupants were represented by life size wax models attired in costumes planned by America's leading designers.

Index to Advertisements

American Car & Foundry Co.	61
American Chemical & Mfg. Co.	12
American Metal Co., Ltd.	66
Anaconda Copper Mining Co.	30
Anaconda Lead Products Co.	30
Antoine Chiris Co.	67
Arditti & Co. A. A.	55
Barber Asphalt Paving Co.	40
Beacon Products Co.	62
Binney & Smith Co., Inc.	71
Brown Portable Conveying Mach. Co	74
Commercial Solvents Corp.	70
Dow Chemical Co.	16
Draper Mfg. Co.	Cover
Du Pont de Nemours & Co., E. I.	57
Eagle-Picher Lead Co.	52
Electro Bleaching Gas Co.	72
Garrigues Co., Chas. F.	22
Garrigue, William, & Co.	18
General Chemical Co.	8
Great Northern Trading Co.	71
Greeley Products Corp.	55
Goldsmith Bros., S. & R., Co.	65
Hercules Powder Co.	54
Hydrocarbon Chemical Products Co.	74
Innis, Speiden & Co.	60
Interstate Products Corp.	50
Javitz & Co., E. M.	28
Jordan, William E., Inc.	42
Kalbfleisch Corp.	70
Knight, Maurice A.	10
Kohnstamm, H., & Co.	63
Lazard Godchaux Co. of America, Inc.	44
Monsanto Chemical Works	26
Merck & Co.	6
Meteor Products Co., Inc.	36
Michigan Iron & Chemical Co.	73
Miner-Edgar Co.	32
National Aniline & Chemical Co.	24
Neuberg, Wm.	34
New York Color & Chemical Co.	46
Page, Chas., & Co., Ltd.	64
Peters, C. B. Co. Inc.	38
Pfizer Chas. & Co., Inc.	14
Price, Edwin C., & Co.	68
Proctor & Schwartz, Inc.	20
Research Corporation	67
Rockhill & Vietor	69
Schlesinger	56
Scott, Ernest & Co.	4
Semet Solvay Co.	73
Stokes, F. J., Machine Co.	69
Sutton F.	59
Takamine Commercial Corp.	48
U. S. Industrial Chemical Co.	72
Wah Chang Trading Corp.	68
Warner Chemical Co.	65
Weisenthal & Co.	64
Wolf, Jacques, & Co.	66
Yaryan & Rosin Turpentine Co.	54

TAKAMINE

JAPAN

consumes tremendous quantities of American-made Chemicals

Are You Getting Your Share of This Valuable Business?

TRADE MARK
TAKAMINE

Exporters of

Fine and Heavy Chemicals
Chemical Machinery

Importers of

Japanese Specialties

We are constantly in the market. Let us have your offerings.

TAKAMINE COMMERCIAL CORP.

OSAKA NEW YORK TOKIO
120 Broadway

Information gladly furnished to manufacturers on trade conditions in the Far East.

Cable Address: "Takamine," New York; "Polyzime," Tokio.
Correspondents in the Principal Markets of the World.

MANUFACTURERS OF

NEO-ARSAMINOL ("914")
ARSAMINOL ("606")
MERPOSAL MERPOTIDE
BOROTETRAMINE
TUYOL HIRATHIOL
TAKAMINE PROTEIN FEED
TAQUININE POLYZIME T
TAKA-RISE

and other Chemical and Pharmaceutical Products

TRADE MARK
Registered U. S Patent Office

USE

POLYZIME

FOR

De-gumming and De-sizing.

A powerful enzyme product of Japanese origin and thin consistency, invented by Dr. Jokichi Takamine and manufactured by TAKAMINE LABORATORY, Inc.

Sole Selling Agents for the United States:
Chas. S. Tanner Company (Established 1866)
Providence, Rhode Island, U. S. A.

Takamine Laboratory, Inc.
Manufacturing Chemists

Takamine Building,
12 Dutch Street, New York.

Laboratory and Works:
CLIFTON, N. J.

Cable Address:
"Jokichi," New York

1995 Paint Questions Answered

The New Book on Painting Problems

FOR Master Painter, Paint Manufacturer, Varnish Manufacturer, Paint Salesman and all others interested in the Paint and Varnish Industry.

Price, $6.00

THE PAINTERS MAGAZINE
100 WILLIAM STREET NEW YORK

INTERSTATE PRODUCTS

We announce to the trade an increased production of ANTHRAQUINONE of unexcelled purity.

We are equipped to supply the American Vat Dye Manufacturer with this important Intermediate in the highest degree of quality and in any quantity. Our superb facilities—both as to equipment and raw material supply—enable us to manufacture this material in large quantities at an unequalled low production cost.

Anthraquinone Sublimed

Yellowish White Crystals
Free from anthracene, carbazol, phenanthrene, etc.
Purity: 98% or over anthraquinone

Anthraquinone Technical

Grayish White Powder
Free from anthracene, carbazol, phenanthrene, etc
Purity: 95% or over anthraquinone

Anthraquinone Paste

Yellowish White Creamy Texture
Absolutely free from grit
Anthraquinone content: 20%, 25% or 30%

Your inquiries solicited—Samples and quotations on request

Write or Wire

INTERSTATE PRODUCTS

INTERSTATE PRODUCTS CORPORATION

BRISTOL—TENNESSEE—VIRGINIA

In November will appear
the fifty-third edition of

The Druggists Circular RED BOOK

It will contain much information not given in the current (fifty-second) issue, addition of items and changes in prices now being made daily.

This *Price-List Supplement* of the CIRCULAR is as standard as the Pharmacopoeia itself —each in its own field—but rapid changes in the commercial world render an edition of the Red Book obsolete in less than a year.

Without the latest Red Book a druggist, every day, is apt to lose money on a sale, lose a sale, lose a customer, lose prestige

The druggist who tries to do business with an obsolete Pharmacopoeia or an obsolete Red Book is handicapping himself heavily, especially when his competitor is working with up-to-date books.

The fall Red Book will be sent free to each paid-up subscriber of THE DRUGGISTS CIRCULAR. Examine the label on your CIRCULAR wrapper and see if you are paid up, as you cannot afford to miss the new, revised, enlarged and improved Red Book which will be distributed in two months from now.

THE DRUGGISTS CIRCULAR
100 WILLIAM STREET -:- NEW YORK

THE EAGLE-PICHER LEAD COMPANY
EAGLE
PICHER
ESTABLISHED·1845

A LEAD *Product for Every* LEAD *Purpose*

Pure Lead Pigments, *Dry*

Litharge *for*
Storage Batteries
Glass, Rubber
Insulated Wire
Mechanical Rubber Goods, Linoleum
Oil Refining
Varnish, Driers
Colors, Inks
Enameling
Ceramics
Insecticides
Assaying, Cyaniding
Lead and Glycerine Cements
Greases, etc., etc.

Sublimed White Lead *for* (Basic Sulphate)
Mixed Paints
Rubber, Oil Cloth
Shade Cloth

Sublimed Blue Lead *for*
Metal Paints
Rubber

Red Lead *for*
Paints
Storage Batteries
Rubber, Glass
Enameling
Ceramics
Varnish
Linoleum, etc., etc.

Orange Mineral *for*
Paints, Colors
Printing Inks

White Lead *for* (Basic Carbonate)
Mixed Paints
Rubber
Wall Paper
Shade Cloth
Coated Paper
Enameled Ware
Ceramics
Chemical and Pharmaceutical Compounds

Pure Lead Pigments, *in Oil*

White Lead in Oil
(Eagle Brand, Old Dutch Process)
Painting and decorating
Stamp press die lubricant

Sublimed White Lead in Oil
Painting and decorating
Gas resistant, chemically inert, highly basic, rust inhibitive

Sublimed Blue Lead in Oil
for painting structural metals.
Weathers to a steel gray color.
Highly basic, gas resistant and unequalled for rust inhibition

Red Lead in Oil
Finest quality of red lead suitable for metal painting, ground in pure linseed oil

Metal Products

Lead Pipe

Sheet Lead

Lead Traps, etc.
Made from virgin, refined pig lead to meet specifications

Babbitt Metals
Standard grades to meet every requirement, made from pure, refined metals. Special analysis metal to order.

Block Tin Pipe
Made from pure Straits Tin in any weight or size

Lead Bottles
Spun from virgin, refined pig lead

Lead Wool

Wedge Lead

Tin Wire, Tape and Ribbon

Lead Wire and Rod

Solder
All grades and forms

Special Mixed Metals

Ingot Lead

Pot Lead

Pig Lead

Slab Zinc Sulphuric Acid Lithopone

The EAGLE-PICHER LEAD *Company*
208 South La Salle Street, Chicago, Ill.
New York Philadelphia Baltimore Pittsburgh
Cleveland Cincinnati St. Louis Kansas City
And All Principal Cities

ANILINE DYES IN MUKDEN

United States Supplied 50 Per Cent. of Trade in 1919—Germany Busy

A fair demand for aniline dyes exists throughout the Mukden, China, consular district, reports Consul Genefal A. W. Pontius. According to the customs returns for the year 1919 the total amount of this class of dyes imported into China was valued at $4,229,556, and of this amount about $200,000 worth was disposed of in Manchuria. During prosperous years the annual consumption of aniline dyes in Manchuria exceeds $250,000.

Prior to the war German dyes practically monopolized the China market. As the war cut off this source of supply, prices soon soared to a prohibitive figure, although there were stocks of considerable quantities.

Of the total amount of aniline dyes imported into China during the year 1919, over 50 per cent. arrived from the United States and about 25 per cent. from Japan, the remainder being of French and other origin. All pre-war stocks of the once popular-known dyes were early exhausted. Nevertheless, most of the dyes now offered for sale locally bear German labels, correct in every detail, and purport to be the products of specific German firms. These products sell at the old low pre-war prices—in some cases a trifle cheaper. There is also sold in the local market a popular line of cheap aniline dyes bearing an American label, giving the place of manufacture as New York city These goods come in assorted colors, similarly packed and priced to the dyes bearing German labels. Inquiry made among the Chinese dealers shows that the stocks are obtained from Japanese firms in Mukden and Chinese wholesalers in Newchwang who deal exclusively in Japanese goods. Owing to the exceedingly low prices at which these dyes are offered for sale, it is only reasonable to suppose that they are imitations:—

The dyes are put up in 8-ounce tins of various colors and shades, varying according to colors and prices as follows:—

Colors	Small coin per tin.
Pink	$3.80
Maroon	2.40
Orange	1.80
Yellow	2.50
Green	2.10
Violet	2.10
Blue	2.10
Black	1.80

At the present rate of exchange $1 small coin is equal to about 40 cents United States currency.

There are a few bottles of real German crystalline dyes to be found in some of the local Chinese stores put up in 2-ounce bottles, which sell for about five times that of the 8-ounce grades mentioned above. There is no question about the genuineness of these crystalline dyes, as they were purchased from German importers prior to the war.

The dyes sold in the local market are put up in tins 5¾ inches by 2¾ inches by 2 inches in size, bear wrappers in colors similar to the dyes incloseed, and are packed in tin label or oil-paper-lined wooden cases strapped with iron, each case containing 100 tins.

The Japanese importers and Chinese wholesale dealers grant their customers 20 days' credit, with the privilege of another 30 days' extension if desired.

American dye manufacturers desirous of extending the sale of their products in this market should appoint reliable local agents and keep them well supplied with stocks in order that they may make quick deliveries. Furthermore, these agents should be instructed to keep a close watch on imitations of marks and chops. Liberal credits must be granted to the local trade.

Serbian Company Has Monopoly of Aniline Dye Trade in Serbia

Serbian pre-war trade in aniline dyes was controlled by the German concerns Bayer Anilin Fabriken and the Cassel Anilin Fabriken. These companies maintained a stock in Belgrade and sold to the various home industries, such as the weavers of Pirot rugs, in small quantities usually a few kilos at a time. The distribution of this stock to the consumers was invariably made by parcel post against cash payments. The stocks of these two German firms have been taken over by a Serbian company, Tanaskovitch & Bogdanovitch, of Belgrade, who have a practical monopoly of the trade for the time being.

DYES IN GREECE

American Consul States Market Exists for American Product in Western Section

There is at present a market for a limited quantity of dyestuffs among manufacturers of knitted goods in Western Greece and in the weaving of rugs of a very high quality produced on hand-operated looms in the Southern part of the Patras district, states Consul George H. Styles in a recent report. It is estimated that these two branches of the textile industry in Western Greece will require dyes to the value of about $1,000,000 during the year beginning about July, 1920. Because of the lack of proper and reasonable priced dye material considerable quantities of wool are now being exported from Western Greece, which prior to the war was practically all converted into knit goods and floor coverings of an exceptionally high class.

During the last two years the supply of dyestuffs for Western Greece has been imported exclusively from England, with the possibile exception of 1 or 2 tons of German dyes which came through Switzerland. The colors most desired are black, navy blue, brown, red, green and orange. Prices range from about $8 to $12 per kilo (2.2046 pounds avoirdupois), or from about $3.62 to $5.45 per pound. Greek importers desire to receive quotations of prices, together with special instructions as to how American dyes should be used. All literature and correspondence should preferably be in French, unless the Greek language is used, or it is known that the dealer understands English. The terms desired by importers of dyes in the Patras district are cash against documents at Patras, but many American firms are now receiving from 30 to 40 per cent. paid in New York against shipping documents, leaving the balance to be collected on the presentation of the documents at port of arrival in Greece.

CHILEAN NITRATE SITUATION REVIEWED BY BRITISH OVERSEAS TRADE DEPARTMENT

London Benefited by Fluctuation in Exchange—Shipping Strike Hurts Exports—American Ownership of Industry Only 2 per Cent.

LONDON, Sept. 8, 1920.

The Department of Overseas Trade has issued a report on the Chilean nitrate situation under date of September 7, 1920. It is interesting to note that of the various interests represented in the industry the Jugo-Slavs are credited with an ownership totaling 10 per cent. as against an American ownership of 2 per cent. The report in full is as follows:—

No substantial sales of nitrate have taken place since the early part of the year, and during the first fortnight of June last many rumors were in circulation regarding large sales being imminent, but no business of importance was done. Owing in large measure to continued stagnation in the nitrate market exchange fluctuated considerably in favor of London.

Existing stocks of nitrate on June 30, 1920, the close of the statistical year, were calculated at about 970,000 tons, of which 830,000 belong to the members of the Nitrate Association and 140,000 to producers outside the association, i. e., Americans and Germans.

The sales to date made by the association for delivery from July, 1920, to April, 1921, are 1,343,000 tons at prices averaging about 16s. 5d. per quintal of 46 kilos, which covers the whole of the stocks existing on the coast, plus the production to the end of September next, the monthly production of the association being about 184,000 tons. Non-associated producers are believed to have sold all their stocks, plus the greater part of their production up to December next, this latter being about 46,000 tons monthly (Americans accounting for 8,000 tons) and at prices considerably below the association average. The Germans have also sold substantial parcels of nitrate for consecutive deliveries in 1921 and 1922 at what seem to be low prices today.

Included in the production figures there are about 6,000 tons monthly of high potash nitrate (K.N.O.3), of which about 700 tons are made by the Germans.

Demand Brisk

The demand for nitrate continues brisk at the association's fixed prices; however, owing to difficulties of production and transport caused by labor troubles, shortages of coal, oil and water and rolling stock on some of the railways, the association is seriously considering the limitation of sales for further future deliveries. It is possible, however, that further limited contracts will be made by the association for delivery up to April, 1921.

The commercial secretary to the British Legation at Santiago in forwarding to the Department of Overseas Trade the above report, which was furnished by one of the directors of the Nitrate Association, states that the Nitrate Association is conducted by a board of ten directors, of whom four are government delegates, the executive being exercised by a sales committee of five. The Americans who do not form part of the association state that they cannot join owing to the Sherman anti-trust law. The Chilean government has been putting continual pressure on the Germans to join the association, but up to the present time they have held themselves apart.

Regarding production difficulties apart from local strikes, fuel has become scarce. Coal from the United Kingdom is unobtainable, from the United States of America supplies are difficult to obtain, and it is stated that export has been temporarily prohibited. Supplies of Australian coal, which is not economical for nitrate oficinas, cannot be depended upon. Chilean coal, owing to the recent continued strikes, is unobtainable, and also not economical when used. Oil fuel is becoming very scarce, and two British firms representing two large American oil companies have received information from their suppliers that owing to decreased production and increased consumption they must reduce, or in some cases cancel altogether, pending oil contracts.

Poor Railroad Facilities

The majority of the British companies have not greatly benefited by the recent large sales, owing to the fact that the rail transport to Iquique by the Nitrate Railways, Ltd., falls so far short of the demand made on it. The commercial secretary is informed that several British nitrate oficinas have one year's production awaiting the convenience of the railway.

On the same subject his Majesty's consul at Antofagasta reports the total production and export for the last three years as follows:—

	1917-18. Quintals.	1918-19. Quintals.	1919-20. Quintals.
Production	64,773,489	50,707,926	42,551,779
Export	63,325,382	39,007,083	47,901,232

(Quintal equivalent to 101.44 English pounds.)

Destination of exports for this year has been fairly evenly divided between Europe and the States.

The exports for the present year would have been much greater but for a serious shipping strike which broke out in June and which has seriously interfered with shipments. In pre-war days the total exports amounted to between 45,000,000 and 50,000,000 quintals.

Total production for the first six months of 1920 amounted to 26,158,367 quintals and exports to 33,173,982 quintals. From the immediately preceding figures the great activity in nitrate circles for the present year can be seen. Total stocks on the coast as of June 30 amounted to 27,500,000 quintals, more or less.

Due to labor shortage and troubles respectively, and to the impossibility of securing more than 75 per cent. of contracted quantities of fuel oil—with every chance of a still further reduction—it is estimated that future production will not exceed present output.

The average cost on board is reported to be 12 shillings per quintal maximum. It appears, therefore, that large profits are being and will be made. Before the war sellers were content with pence per quintal profit, but apparently for the present profits are considered in shillings per quintal instead of pence. Some of the cheaper producing factories must be making very large profits.

It must be borne in mind, however, that the year after the armistice was a bad year for nitrate interests and also that speculators for the first half of this year, at any rate, have again secured the cream of the business, as was also largely the case before and during a certain period of the war.

New factories are to be erected in the course of a year on grounds situated at Los Dones, which is about 50 kilometers along the Longitudinal Railway in northerly direction toward Toco.

The production will be shipped either here or at Mejillones, as the Antofagasta-to-Bolivia Railway has taken over the northern section of the Chilean Longitudinal Railway, as is already known.

The various national interests in the industry are approximately:—

	Per cent.
Chilean	36
British	34
Jugo-Slav	10
German	18
American	2

Chemical Warfare Service Perfects Gas Mask—May Move School to Edgewood Arsenal

WASHINGTON, Sept. 21, 1920.

Attention continues to be given by experts of the Chemical Warfare Service of the army to improvements in gas masks to keep out known poisonous gases effectively, to the production of new gases that possibly also may be devised by an enemy, and to the perfection of masks that will render the new gases non-effective to the wearers. This is with a view of anticipating new gases by having defensive measures ready for them. Brigadier General Amos A. Fries, chief of the Chemical Warfare Service, has recommended that the Chemical Warfare School be moved from the proving ground at Lakehurst, N. J., to Edgewood Arsenal, Md., where better facilities for the instruction and training of officers are said to be available, and it is expected that the recommendation will be approved by the War Department.

Gelatines Prepared from Seaweed—Agar Agar to Be Produced Commercially

WASHINGTON, Sept. 22, 1920.

Working at the laboratory of the United States Fisheries Bureau, at Woods Hole, Mass., Dr. I. A. Field has prepared a series of fine gelatines from common species of seaweeds, it is officially announced here. It is also announced that a report has just come from a representative of the bureau at San Francisco that a concern has been organized in California for the manufacture of agar agar on a commercial scale. The company is stated to have invested approximately $40,000 to date and employs about 15 persons.

LARGE ACID TANK CAR

An Epoch Making Event in the Transportation of Sulphuric Acid

If Mr. Plain Citizen thinks of sulphuric acid at all, it is probably in terms of pounds. The average manufacturer of this chemical handles from 33 to 50 tons of the acid in a single tank car. And now comes the news that a tank car capable of conveying 75 tons—150,000 pounds—has been perfected. After years of experimental work, the General Chemical Co. has developed this mammoth acid tank car, and is having 50 of them built by the American Car and Foundry Co., at Berwick and Milton, Pa

Those who are old enough and young enough to have studied high school chemistry and to have remembered it, will recall that concentrated sulphuric acid weighs nearly twice as much as water, and that its sudden mixture with water results in a violent explosion. These two facts have an important bearing on its transportation. To carry an acid of such great weight and to guard it against contact with moisture requires an absolutely air tight tank car of exceptionally sturdy construction. Up to this time the largest car possessing these requirements has had a maximum capacity of 50 tons.

In developing its 75-ton car, the General Chemical Co has proceeded along new lines by building it of three longitudinal sheets of steel. This in itself is an achievement, as it is by no means easy to form one-piece sections of the length required. The ordinary type of acid tank car is composed of five latitudinal sections with one bottom longitudinal sheet.

The new car itself weighs nearly 25 tons—49,600 pounds, to be exact—and its official capacity is 140,000 pounds of sulphuric acid, although actually it is capable of holding 150,000 pounds.

A model of this epoch-making tank car has been made by the General Chemical Co. at its own foundry in Pulaski, Va. It took eight weeks to build it, but the result is perfect in every detail. It is constructed to a scale of 1¼ inches to a foot and is 47 inches long over the end sills and 18¼ inches high over all. This model was on exhibition at the Sixth National Exposition of Chemical Industries held at Grand Central Palace, New York city. The drum head is complete, with its filler cap, through which acid enters the car; its discharge pipe with screw cap through which the car is emptied, with the assistance of compressed air forced into it; and its safety vent which automatically exhausts when the pressure exceeds 30 pounds. In fact, the original and the model are similar down to the most minute details, including running boards, ladder, trucks, wheels, brakes, and even in the number of rivets, which is 1,200.

It is interesting to note that the model was painted and lettered exactly the same way as the original, and that it was the largest small job in the history of sign painting. J. P. McMalters, who is a pioneer in the field of lettering, delegated a man who was formerly a foreman painter in the Erie car shops to paint the 1,060 letters in the job, which comprised 21 lineal feet.

As railroad men and manufacturers and users of sulphuric acid will realize, the achievement of the General Chemical Co. in developing a 70-ton sulphuric acid tank car is a historic one in transportation annals, and for that reason the model car at the exposition is the center of unusual interest.

AN ICICLE UPSIDE DOWN

Alum for Countless Sore Throats Can Be Seen at Chemical Exposition

Having definitely decided that Ann's age is the business of nobody but the lady herself, the data hounds are now busily engaged in trying to find out how many faces can be puckered by 1,200 pounds of alum. This problem has been precipitated by the display of this enormous quantity in one lump at the Sixth National Exposition of Chemical Industries held last week at the Grand Central Palace, this city.

Twelve hundred pound lumps of alum are everyday occurrences with the General Chemical Co., which is exhibiting this particular sample. That is the form in which they produce this material in the ordinary routine of their manufacture.

There is an interesting connection between this method and the experiment we tried in our childhood days—namely, placing a nail in a glass of alum solution and observing an "icicle" of alum crystallize thereon. The chemical law underlying both processes is identical. In the manufacture of alum, the General Chemical Co. place 6,000 pounds of a solution of this chemical in a mold six feet high and six feet in diameter. After many days the alum crystallizes on the sides of the mold.

From this process there result some beautiful shapes of crystals. These hang from the mass proper in the form of icicles upside down. The inverted shape is due to the greater weight of the alum crystal as compared with that of the water from which icicles are formed.

In the lump on display at the chemical show there were five great icicles and many smaller ones. Two of the heaviest of these, measuring approximately 1½ feet in length, have broken off in transit from their works at Laurel Hill, L. I., despite the extraordinary precautions taken to transport the alum in a special hay-packed truck which moved through the city streets at night. Three others, each about 1 foot in length, are still to be seen. By the employment of an effective lighting arrangement these crystals are well displayed, and possess in miniature form the beauty of the stalactites and stalagmites which are found in Southern and Western caverns and which are the goal of sightseers from all over the country.

The unusual feature of this exhibit is that it was not specially prepared for the occasion, but is from one of the molds which the company picked out at random from its factory. Incidentally, the alum which is crystallized in this way is absolutely pure, meeting U. S. P. requirements. The great crystals are broken up and are sold either as smaller crystals, or in ground or powdered form. Great quantities are used commercially and for medicinal purposes. Just how many puckered faces might be caused by the interesting lump now on exhibition will no doubt be determined by private statisticians before the end of the week.

Dyestuffs Exports in July, 1920, Valued at $3,018,188 as Against $872,091 for July, 1919

WASHINGTON, Sept. 16, 1920.

The United States exported $3,018,188 worth of dyes and dyestuffs last July as compared to $872,091 for the same month last year, and a total of $20,741,999 for the first seven months of 1920, as compared to $9,887,772 for the previous year's seven-month period, according to figures made public by the Bureau of Foreign and Domestic Commerce.

ROSIN

Present conditions are unusual
The outlook for balance of season is not promising
Right now is generally considered the time to Buy

Write us for full information—Then Act

SERVICE:

Consider us a Bureau of Information on Naval Stores that is at your service, to furnish free, statistics on production-consumption-stocks and outlook, both for Wood rosin and Gum rosin, so that you may be as fully and correctly informed as possible and thus be in position to judge what will best serve your interests.

Our Technical Service is also at your disposal to assist in determining the quality and possibilities of Yaryan rosin for your needs and developing methods and formulas for their use.

As Wood rosin and Gum rosin must both be fully utilized and economically used, to supply users requirements—there being no successful substitute for rosin—we stand ready to co-operate with users to accomplish this end.

HERCULES POWDER CO.

operating

YARYAN ROSIN & TURPENTINE COMPANY

BRUNSWICK, GA.

PLANTS:
Brunswick, Ga.
Gulfport, Miss.

CODES:
A. B. C. 5th Edition
Liebers Western Union
5 Letter Edition

Cable Address "YARMOR"

Established 1914

Telephone, Beekman 8247-8248

A. A. ARDITTI & COMPANY

Manufacturers' Agents, Importers and Dealers in

CHEMICALS, DRUGS AND OILS

Cable Address
ARDIBAR, N. Y.

MAIN SALES OFFICE
116 Nassau Street, N. Y.

WAREHOUSES
New York—Brooklyn—Jersey City

ACIDS
Acetic (all grades)
Carbolic (Phenol)
Citric
Muriatic (Hydrochloric)
Oxalic
Tartaric
Ammonium Carbonate
Aniline Oil and Salt
Arsenic (White and Red)
Benzol (90% and C. P.)
CAMPHOR (American and Japanese)
Cream of Tartar (99/100% U. S. P.)
Cyanide of Soda (American and Foreign)
Formaldehyde (40% Volume U. S. P.)
Naphthaline (Prime White 79-81 M. P.)
POTASSIUM
Bichromate
Binoxalate
Red Prussiate
Yellow Prussiate

ARDICO PRODUCTS — RELIABILITY AAA&Co EFFICIENCY

QUININE SULPHATE U. S. P. JAVA
Saccharin
Sal Ammonia,
First English Lump
Soda Ash (light and dense)
Soda Caustic (all grades)

SODIUM
Benzoate
Bicarbonate
Bichromate
Hyposulphite
Nitrite
Prussiate
Silicate

OILS
Castor
Camphor
Chinawood
Cocoanut
Corn
Linseed
Olive
Palm
Peanut
Soya

THE NAME "ARDICO" STANDS FOR PURITY, RELIABILITY AND EFFICIENCY
ASK FOR OUR CATALOGUE DESCRIBING FULL LINE

GREELEY PRODUCTS CORPORATION

Manufacturers and Importers

15 PARK ROW NEW YORK CITY

TELEPHONE, BARCLAY 7698-7699

DIVISIONS

Petroleum and Pine Products
Chemicals and Intermediates
Pharmaceuticals and Drugs
Paint and Varnish Raw Materials
Vegetable, Fish and Animal Oils
Naval Stores

GREELEY PRODUCTS CORPORATION QUALITY GREELEY PRODUCTS NEW YORK U.S.A.

Chemical Plants are plentiful

WHEN you start out to find a new chemical plant or an old one for a new purpose, you may feel that it is difficult to obtain just what you want for the reason that the problem is one which you are not very often called upon to solve, and there is doubt as to where to begin looking. We devote all our time procuring plants for manufacturers in every line and quite often come across plants which would be better suited for some chemical industry than for the particular line for which they are being used. It stands to reason that a concern of our National Scope is better equipped to find a factory for a manufacturer than the manufacturer is. If you have not heard of our operations or dealt with us in the past—ask the man next to you.

"Schlesinger for Factories"
EVERYWHERE

Essex Building, Newark
MARKET 6500

Times Sq. Building, New York
BRYANT 192

DU PONT DYESTUFFS

MOLECULES *and* MAN

"AN industry which produces over a billion dollars' worth of finished products is important; an industry which makes a billion dollars' worth of invisible particles is interesting; an industry which insures our future is valuable; an industry which defends our homes is essential. It is the Chemical Industry which does all these things and it, therefore, is of primary interest to all citizens because of its direct influence on national prosperity. It is as essential to modern Civilization as agriculture is to any civilization."

The above is the introductory paragraph of our new booklet—"Molecules and Man"—which explains the vital importance of the American dyestuff industry. If you did not get your copy at the National Exposition of Chemical Industries last week, write us for it.

E. I. DU PONT DE NEMOURS & CO., Inc.
Dyestuffs Sales Department
WILMINGTON, DELAWARE

Branch Offices: New York, Boston, Philadelphia, Chicago, Providence, Charlotte, N. C.

DU PONT

THE BUYING POWER

of the Clientele of the

Oil, Paint and Drug Reporter

IS NEARLY FIVE BILLION DOLLARS

This buying power is made up of the leading concerns in the following great industrial

Chemicals and Allied Products; Dyestuffs, Natural, Coal Tar and Intermediates; Drugs and Pharmaceutical Chemicals; Fertilizers; Petroleum, Crude and Refined; Animal, Fish and Vegetable Oils; Paints, Varnishes, Glass, Naval Stores. Whether you are a buyer or a seller of any these products you would find it to your financial advantage to advertise in the Reporter, the weekly issues of which are consulted by Manufacturers, Importers, Manufacturing Consumers and Wholesale Distributers in all parts of the world.

The Reporter is read by principals—those who have the final say-so—and that is one of the reasons why it has contributed so largely in the upbuilding of the industries it represents, and futhermore it is another reason why it is a great advertising medium.

Begin your advertisement in the Reporter at once and thus avail yourself of the wonderful opportunity which it offers for the extension of your business to all parts of the world.

Display Advertising Rates per Insertion

This is a TWO INCH SPACE—

13	weeks	$8.00	per	issue
26	"	7.00	"	"
52	"	6.00	"	"

This is a FOUR INCH SPACE—

13	weeks	$14.00	per	issue
26	"	12.00	"	"
52	"	9.00	"	"

This is a SIX INCH SPACE—

13	weeks	$17.00	per	issue
26	"	15.00	"	"
52	"	12.00	"	"

This is a QUARTER PAGE—

13	weeks	$26.00	per	issue
26	"	24.00	"	"
52	"	19.00	"	"

Oil, Paint and Drug Reporter Inc., 100 William Street NEW YORK CITY

Cable Address: "SUTTONENG" New York Telephone 960-961 Rector

FRANK SUTTON

Member American Society Mechanical Engineers

Mill and Factory Engineer

WEST STREET BUILDING

ONE-FORTY CEDAR STREET

NEW YORK CITY

PLANS and specifications prepared for chemical and manufacturing buildings, power plants, steam engineering, electric transmission and motor work, sprinkler and fire protection equipments, water supply and design of chemical apparatus and machinery.

References:

Spencer Kellogg & Sons, New York City and Buffalo
Central Dyestuff & Chemical Co., Newark, N. J.
Wilckes, Martin, Wilckes Co., New York City and Camden, N. J.
Charles Pfizer & Co., New York City
Valentine & Co., New York City
Arlington Co., New York City
Antoine Chiris Co., New York City
Scott & Bowne, Watsessing, N. J.
Zinsser & Co., Hastings-on-Hudson, N. Y.
Hammersley Mfg. Co., New York City
Keystone Leather Co., Philadelphia, Pa.
Glamorgan Pipe & Foundry Co., Lynchburg, Va.
Drummond Iron Works, New York City
Athenia Steel Co., New York City
M. H. Treadwell Co., New York City
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.
National Coal Tar Co., New York
Bosch Magneto Co., Springfield, Mass.
Manati Sugar Co., New York
Belding-Paul-Corticelli, Ltd., Montreal, Canada
Johnson, Cowdin & Co., Paterson, N. J.
Gryphon Rubber & Tire Co., New York City
James Shewan & Sons, Shipyard, Brooklyn, N. Y.
W. R. Grace & Co., New York City
J. J. Little & Ives Co., New York City
Atlantic & Pacific Steamship Corp., New York City

Examinations and reports on proposed manufacturing plants, also renovations and improvements on existing plants.

INNIS, SPEIDEN & CO.

ESTABLISHED 1816

Manufacturers, Importers and Exporters

of Industrial Chemicals, Colors, Etc.

MAIN OFFICE:

46 Cliff Street, New York, N. Y.

BRANCH OFFICES:

Chicago Philadelphia Boston Gloversville, N. Y. Cleveland

FACTORIES:

Niagara Falls, N. Y. Jersey City, N. J. Murphysboro, Ill.

SOLE SELLING AGENTS:

Isco Chemical Co., Niagara Falls, *Manufacturers of Chlorine Products, Caustic Soda, Etc.*
Isco Bautz Co., Murphysboro, Ill., *Manufacturers of Decomposed Silica*
Sheffield By-Products Co., *Manufacturers of Casein, Milk Sugar, Etc.*
Carpenter Cheese Co., *Manufacturers of Casein, Milk Sugar, Etc.*
And various other American Manufactu ers

PRODUCTS:

ACIDS
- Arsenic
- Boric
- Citric
- Formic
- Oxalic
- Phosphoric
- Tannic
- Tartaric

ACETYLENE
- Tetrachloride

ALUM
- Alum Chrome

ALBUMEN
- Milk
- Egg and Blood

ALKALIS

AMMONIA
- Chloride
- Carbonate

ANILINE
- Oil
- Salts

ANTIMONY
- Needle
- Oxide
- Salts
- Sulphuret

ARCHIL

BARIUM
- Carbonate
- Chloride
- Fluoride
- Hydrate
- Nitrate
- Peroxide
- Sulphate
  - Pulp and Powder

BLEACH

BORAX

CARBON
- Tetrachloride
- Decolorizing

CASEIN

COPPER
- Sulphate
- Carbonate
- Oxide

DYESTUFFS

ELECTROPLATING MATERIALS

FORMATES

GUMS

IRON PERCHLORIDE

LEATHER FINISHES AND SEASONS

LITHOPONE

MOSS
- Sea

MAGNESITE
- Crude
- Calcined

MAGNESIUM
- Carbonate
- Chloride
- Sulphate

MANGANESE
- Oxide
- Monochrome

NICKEL
- Salts

POTASH
- Bicarbonate
- Bichromate
- Carbonate
- Caustic
- Chlorate
- Chloride
- Ferricyanide
- Ferrocyanide
- Metabisulphite
- Permanganate

POTATO
- Flour

SILICA
- Soft

SODA
- Ash
- Acetate
- Bichromate
- Caustic
- Chlorate
- Ferrocyanide
- Fluoride
- Laundry
- Nitrate
- Nitrite

SODA
- Silica Fluoride
- Sulphate
  - (Crystallized and in Powders)
- Sulphide

STARCH
- Potato
- Tapicoa

SUGAR
- Milk

SULPHUR
- Chloride

TALC

TIN
- Oxide

TURMERIC

ZINC
- Chloride
- Dust
- Oxide
- Sulphate

Durable Construction Freedom from Leakage Low Cost of Maintenance

Note that these three features are appreciated by users of "Car Foundry" Tank Cars:

"We have used a great many cars made by the American Car and Foundry Company and have approximately 150 cars of their make in our service at the present time, some of them having been in constant use since 1905. We have always found the cars to be very substantial, the tanks free from leakage, the maintenance expense very low. The writer has dealt personally with this company for the last thirteen years and has found everyone in the organization anxious at all times to give the very best service to all."

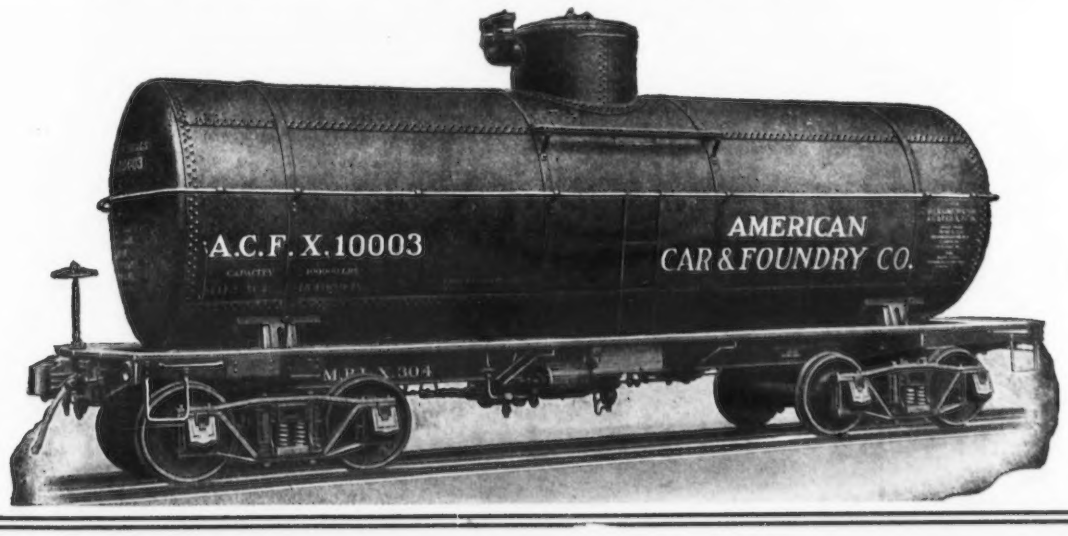
"We are operating 20 tank cars built by the American Car and Foundry Company, 4 purchased in 1911, 6 in 1912, and 10 in 1913. These cars have been in almost contant use, have withstood the hard knocks of railroading, and we have had no occasion for complaint on the subject of leakage. The cost of maintenance appears to us very reasonable, as up to June 30th, 1917, the average on all these cars was but 20 cents per hundred miles run. We cannot but express our entire satisfaction with our treatment by the American Car and Foundry Company and were we to increase our equipment we would order from them."

"We now have 52 cars of American Car and Foundry Company make in our use, most of which have been purchased during the last two or three years, but some running back almost ten years. The maintenance expense appears to us very reasonable and compares favorably with the same expense on cars of other make. We think the American Car and Foundry Company's construction of complete end sill, extra heavy channel center sills, etc., is very substantial. We have found the company prompt, courteous and business-like in their dealings, and it is a pleasure to speak a good word for them."

American Car and Foundry Company

CHICAGO 165 Broadway, NEW YORK ST. LOUIS

Railway coach, dining and sleeping cars; express, baggage and mail cars; electric railway cars; freight cars, including box, flat, gondola, hopper, dumping and tank types and cabooses; special purpose cars for carrying cane, live stock, etc.; industrial, mine and logging cars; car parts, including trucks, coupler pins and links, and chilled cast iron wheels; electric rivet heaters; bar iron and steel; bolts, nuts and rivets; iron-body gate valves; flanged pipe.



BEACON PRODUCTS CO., Inc.

Exporters, Importers, Manufacturers' Agents

154 Nassau Street - - - New York

Phone Beekman 8172-9563

Specialists In

Chemicals

Acids, (Nitric, Lactic, Muriatic, Sulphuric)
Acetic Acid (All Grades)
Alums (Chrome Potash)
Barium Chloride
Bleach
Bichromates (Soda, Potash)
Caustic Soda
Formaldehyde
Naphthalene Flakes
Soda Ash
Sulphate of Alumina
Salt Cake
Sulphur

Drugs, Pharmaceuticals

Acetanilid
Acetone
Alcohol
Borax
Camphor
Cocoa Butter
Cream of Tartar
Cyanide, Sodium
Epsom Salts
Hexamethylene Tetramine
Menthol
Paraformaldehyde
Quinine
Saccharin
Sodium Benzoate
Vanillin

We always carry a complete stock in warehouse of Ammonium Valerate, Amyl Valerate, Ethyl Valerate, Iron Valerate, Quinine Valerate, Valeric Acid and Zinc Valerate. These products are of standard make.

Let us quote you for your requirements over 1921

Chemicals Colors Dyes Dyewoods Intermediates Glues Oils and Waxes

"WE'RE HERE TO SERVE YOU"

40 Carmine and all Lakes and Fine Colors

Prussian, Chinese Milori and Soluble Blues, Para Reds and Other Dry Colors

Flavoring Extracts

Certified Pure Food Colors

Stearate of Zinc
Alumina Hydrate

ESTABLISHED 1851

H. KOHNSTAMM & CO.

NEW YORK
83-93 Park Place

CHICAGO
11-13 East Illinois Street

Business That Runs The Length Of All Carriers

"WHERE THE RAILROAD EXTENDS AND THE WIRE REACHES"

WEISENTHAL & COMPANY

145 WEST 45th STREET NEW YORK CITY

Telephones: Bryant 8275—8858—6593—8534

DEALERS IN

INDUSTRIAL CHEMICALS

CODES: Bentley, A. B. C., Lieber, Marconi, Private

CHAS. PAGE & CO. LTD.

CABLES: "Paganini" London

47-51 KING WILLIAM STREET, LONDON, E. C. 4

26 BROWN STREET, MANCHESTER

Chemicals

For All Trades

Coal Tar and Ammonia Products

Fertilizers

Dyestuffs and Intermediates

PRICE LISTS ON APPLICATION

Offers and Inquiries Invited from Responsible American House

COPPER SULPHATE

(BLUE VITRIOL)

99% Pure

IMMEDIATE DELIVERY

Correspondence Invited

GOLDSMITH BROS.
SMELTING AND REFINING CO.

Plant: 59th and Throop Streets
CHICAGO, ILL.

General Offices: 29 East Madison Street
CHICAGO, ILL.

The Warner Chemical Company

ESTABLISHED 1856

Manufacturers

Acetic Anhydride—85%-90%
Phosphorus, Sulphur and Chlorine Free.
Acetyl Chloride
Acid Phosphoric—50%
Lead and Arsenic Free.
Meets all requirements Pure Food and Drug Laws.
Aluminum Hydrate Light—96%
Carbon Bisulphide
Carbon Tetrachloride
Chalk, Precipitated
Chloroform
Phosphorus Oxychloride
Phosphorus Trichloride
Soda Caustic, Solid—76%-78%
Soda Caustic, Liquid
Sodium Hypochlorite Solution
Sodium Phosphate Monobasic
Sodium Phosphate Dibasic, U.S.P.
Sodium Phosphate Tribasic
Snowhite
Sulphur Chloride

Executive Offices:
52 Vanderbilt Ave., New York City

Plants:
CARTERET, N. J.
SO. CHARLESTON, W. VA.

JACQUES WOLF & CO.

Manufacturing Chemists and Importers

Main Office and Works—PASSAIC, N. J. New York Office—112 JOHN STRFET

All Specialties for the Textile Industries

Soluble Oils

Gums
For Textile Printing

Mordants and Chrome Colors
For Fabric Printing

Hydrosulphites (For all purposes)
Stripping, Discharge Printing
Vat Colors and Indigo Discharge

Chrome Black

Alizarine Yellows

Boil-Off Oil
For Degumming Silk

Bensapol
For Scouring Wool

MONOPOLE OIL
Registered Trade Mark No. 70991

THE AMERICAN METAL CO., LTD.

Sellers of:

ZINC
Prime Western and Brass
ZINC OXIDE ZINC DUST ZINC SULPHATE
TIN GOLD SILVER COAL
LEAD COPPER COPPER SULPHATE
TUNGSTEN FERRO-TUNGSTEN MOLYBDENUM
SULPHURIC ACID 60°—66° ARSENIC
SALT CAKE NITRE CAKE
SELENIUM

Buyers of:

Gold, Silver, Lead, Zinc and Copper Ores
Copper Matte Copper Bullion
Lead Bullion
Tungsten Concentrates

NEW YORK
PITTSBURGH DENVER ST. LOUIS

Zenith POLAR Zinc

Zenith ARCTIC Zinc

"CHIRIS"

ESSENTIAL OILS

AND

SYNTHETIC AROMATIC CHEMICALS

Many of the products which we offer on our list are being manufactured in our American Works in Delawanna, N. J.

As we are in close communication with original sources of supply in many parts of the world, we receive frequent shipments from foreign ports, of such materials, as are not produced in this country.

VANILLA BEANS.—We supply Bourbon Beans from the Comores Islands, grown and cured in accordance with the best known methods. We offer standard qualities at attractive prices.

CAPES-VISCOSE—These self-fixing, air-tight, bottle caps, are now being manufactured in America. We are the sole selling agents.

Send us one of your bottles. We will return it capped, and will be pleased to quote on your requirements.

LONDON, ENGLAND
GRASSE, FRANCE
CANNES, FRANCE
BAUS ROUX, FRANCE
BOUFARIK, ALGERIA

MARQUE DE FABRIQUE · TRADE MARK · AC

PARIS, FRANCE
REGGIO, CALABRIA
MESSINA, SICILY
CAYENNE, GUIANA
HANOI, TONQUIN

ANTOINE CHIRIS COMPANY

ESTABLISHED IN GRASSE, FRANCE
1768

18-20 PLATT STREET - - - - - NEW YORK

Cottrell ELECTRICAL PRECIPITATION Processes

For Air and Gas Cleaning *and* Recovery of Valuable Material

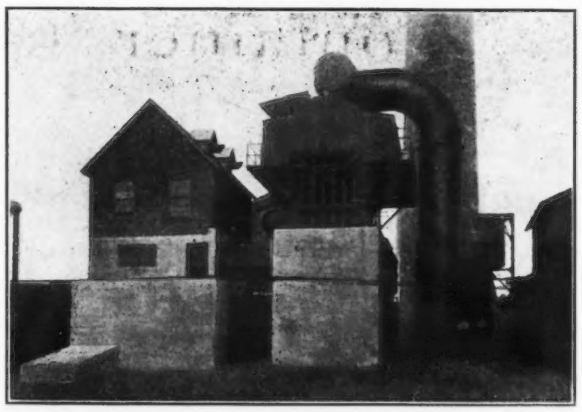
We design, furnish and erect installations of these Processes for a contract price. Some of the typical application of these Processes are to:—

1. Collect and recover lead, tin, and zinc compounds, silver, calcium carbide, phosphoric acid, etc., etc., from waste fumes and gases from smelters, refineries, electrical furnace operations, etc.

2. Collect and recover powdered food products.

3. Collect and recover lamp black and carbon black.

4. Clean the hot sulphur dioxide gases from pyrites roasters in sulphuric acid manufacture.



Cottrell Precipitator recovering dust containing precious metals from lead blast furnace gases. Changing a nuisance into a valuable byproduct.

5. Clean air from grinding buffing, polishing and similar processes.

6. Remove dust, tar and oils from producer gas, coke-oven gas, etc.

7. Remove acid mist and fumes from gases from acid concentrators, pickling vats, nitrating operations, etc., etc.

We also make investigations and reports on dust and fume losses; furnish consulting and engineering services for plant or process design; undertake industrial construction work; develop new processes in conjunction with inventors, patentees, etc.

RESEARCH CORPORATION

Engineers *Consultants* *Constructors*

District Office, 76 West Monroe St., Chicago, Ill.

25 West 43rd Street, New York

Wah Chang Trading Corporation

Head Office—49th Floor Woolworth Building, New York
Shanghai Office—9 Ningpo Road
Branches and Agencies in all important cities in China and abroad
IMPORTERS, EXPORTERS, ENGINEERS AND MANUFACTURERS' AGENTS

Telephone BARCLAY 5596 – 5597 – 9607

Ores, Metals, Chemicals, Machinery, Oriental Oils and Products

Cable Address "WAHCHANG" New York

IMPORTERS OF

METALS AND ORES:
W. C. C. Brand Antimony 99.25 per cent guaranteed minimum purity.
Chinese Needle Antimony (Lumps and Powdered).
Antimony Oxide (Wah Chang's White Oxide of Antimony 98-99 per cent. soluble).
Tin, Chinese No. 1, Straits and Banca.
Tungsten Concentrates.
Bismuth Ores.
Manganese Ores.
Asbestos, Crude.

HAIR, BRISTLES AND HAIRNETS:
Human and Horse Hair, Wool, Camel Hair, and Hairnets.

OILS:
Peanut, Soya Bean, China Wood, Peppermint, Cassia.

EGG PRODUCTS:
Egg Albumen, Yolk and Powder.

SILK GOODS AND RAW SILKS.

MISCELLANEOUS:
Camphor, Gall Nuts, Rice, Straw Braids, Hides and Skins, Rubber, Raw Cotton and Wool, Peanuts, Beans.

GENERAL MERCHANDISE.

EXPORTERS OF

IRON AND STEEL PRODUCTS:
Bars, Wire, Structural Shapes, Tin Plate, Sheets, Pipes and Tubes, Nails, Hardware and Tools.

CONSTRUCTION MATERIALS:
Cement, Lumber, Refractory Brick, etc.

CHEMICALS AND OILS:
Dyestuffs, Drugs, Paints, Gasoline and Lubricating Oils, etc.

PAPERS OF ALL KINDS.

MACHINERY — TEXTILE, MINING, MILLING, AGRICULTURAL, ARSENAL, CHEMICAL, INDUSTRIAL:
All Cotton, Woolen, Silk, Flour, Sugar, Paper, Shoe, and Industrial Machinery; Mining, Milling, Chemical and Textile Plants and Supplies.

MACHINE SHOP EQUIPMENT:
Lathes, Planers, Boring, Milling, Drilling Machines and Machine Tools of all kinds.

POWER PLANT AND ELECTRICAL EQUIPMENT:
Boilers, Engines, Turbines, Condensers, Compressors, Furnaces, Superheaters, Feed Water Heaters, Alternating and Direct Current Generators, Motors, Switchboards and all Accessories.

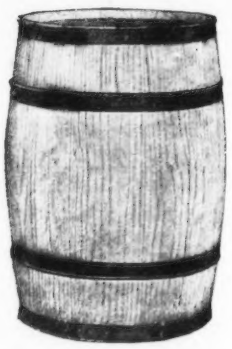
RAILWAY EQUIPMENT:
Locomotives, Cars, Rails for Mining, Industrial and General Railway uses.

AUTOMOBILES AND MOTORCYCLES:
Passenger Cars, Trucks, Motor Buses, Chassis, Tires, Batteries, and all Accessories.

METAL AND METALWARES:
Copper, Brass, Lead, Zinc, Aluminum, Nickel, Cobalt.

GENERAL MERCHANDISE.

Our engineering staff furnishes estimates of plants for all industries. Prompt shipments guaranteed. Our experience in the China trade is large and varied, and inquiries are welcomed.



WHITEWOOD COOPERAGE

Will Eliminate Your Container Troubles

WHITEWOOD, the ideal package, although light in weight, is absolutely tight and impervious to moisture, sufficiently strong to satisfactorily carry your products any place you send them. The rolled galvanized iron hoops expedite filling and reheading, also adding strength. All in all Whitewood is the economical container now largely adopted for the shipment of colors, chemicals, barytes, etc.

Prompt shipment of Whitewood Cooperage which is made in various sizes, carloads or less, can be obtained by addressing today

EDWIN C. PRICE COMPANY

COMMERCE BUILDING
KANSAS CITY, MO.

"Quality & Service"

1822 S. CLARK STREET
CHICAGO, ILL.

Industrial Chemicals

FOR ALL INDUSTRIES

Chemical	Textile	Paint
Paper	Perfumery	Leather
Rubber	Bakery	Glass
Varnish	Soap	Confectionery

Export *Import* *Commission*

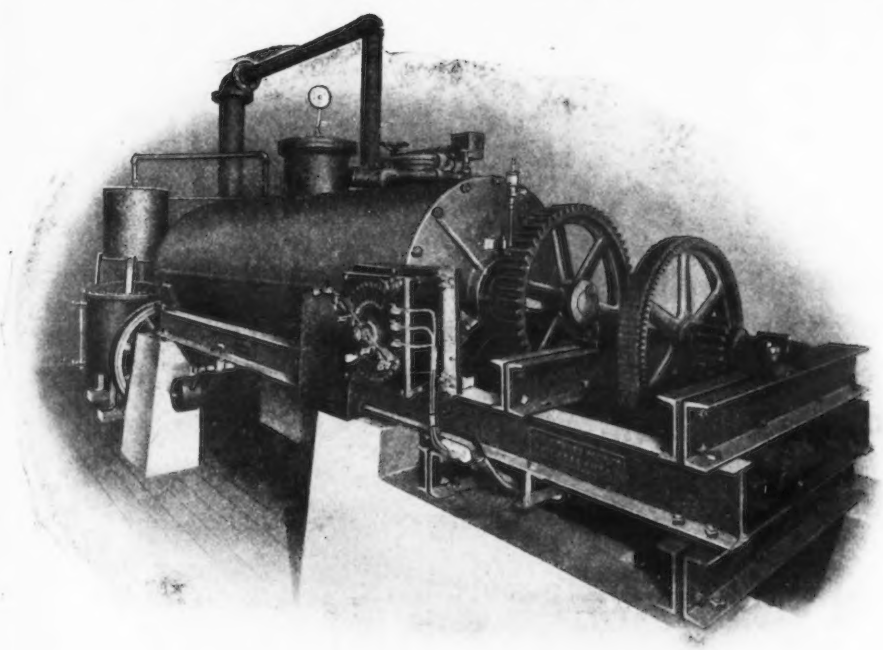
22 Cliff Street
New York

ROCKHILL & VIETOR

Chicago Branch
180 N. Market St.

ESTABLISHED 1884

VACUUM DRYERS



Rotary Vacuum Dryers
Shelf Vacuum Dryers
Atmospheric Drum Dryers
Chemical Machinery
Pharmaceutical Apparatus
Vacuum Evaporators
Automatic Water Stills
Plain and Jacketed Mixers
Briquetting Machines

F. J. STOKES MACHINE CO.

PHILADELPHIA

THE KALBFLEISCH CORPORATION

Manufacturers of

Acids and Chemicals

Thirty-one Union Square West
NEW YORK

BROOKLYN, N. Y. WATERBURY, CONN. ELIZABETHPORT, N. J. ERIE, PA. CHATTANOOGA, TENN.
PROVIDENCE, R. I. DANBURY, CONN. NEWARK, N. J. PATERSON, N. J.

ACIDS

ACETIC
AQUA FORTIS
ELECTROLYTE (for Storage Batteries)
HYDROCHLORIC (Muriatic)
MIXED (Nitro-Sulphuric)
MURIATIC
NITRIC
OIL OF VITRIOL
SOLDERING
SULPHURIC
SULPHUROUS

SODA SALTS

ARTIFICIAL SALTS
ASH (Carbonate)
BISULPHATE (Nitre Cake)
CALCINED SULPHATE
CATHARTIC SALTS
CRYSTALS (Sal Soda)
GLAUBER'S SALT
SAL SODA
SALT CAKE (Glass Makers')
SULPHATE (Anhydrous, pure, for standardizing Aniline Dyes)

ALUMINUM PRODUCTS

AMMONIA ALUM
CHLORIDE OF ALUMINA (Carbonizer)
CONCENTRATED COAGULANT
EXTRA CONCENTRATED ALUM, 22%
FILTER ALUM
PAPER MAKERS' ALUM (all grades)
PURE SULPHATE OF ALUMINA ("Iron Free" for lake colors and bond papers)
SULPHATE OF ALUMINA, 22%

MISCELLANEOUS CHEMICALS

AQUA AMMONIA, all strengths
BANANA LIQUID
BRONZING LIQUID
BORO-PHOSPHATE, crystals
CASEIN
CHLORIDE OF ZINC
CHROMITRON (for polishing and sharpening razor blades, etc.)
COPPERAS (Sulphate of Iron)
DISTILLED WATER
LACQUERS AND THINNERS
NITRATE OF IRON (true and copperas)
NITRATE OF MERCURY (for cutting fur)
PAPER ENAMEL PULP
PERCHLORIDE OF IRON (for etching)
SATIN WHITE
SHELLAC SOLVENT
SOLDERING FLUID
ENGLISH CHINA CLAY

SOLVENTS

ACETONE, C. P.
BUTYL ALCOHOL, NORMAL
ETHYL ALCOHOL, DENATURED

(190 Proof, contains 4% C. P. Acetone.) All Authorized Formulas.

BOOTH No. 317

See Our Exhibit at the
Sixth National Exposition of Chemical Industries
Grand Central Palace, New York
Week of September 20th

COMMERCIAL SOLVENTS CORPORATION

Office
165 BROADWAY
New York

Cable Address
"COMSOLVENT"
New York

Plant
TERRE HAUTE
Indiana

Selling Agents for U. S. A.
W. S. GRAY & CO., 80 Maiden Lane, New York

"OUR SERVICE AT YOUR SERVICE"

GREAT NORTHERN TRADING COMPANY

271 BROADWAY - NEW YORK

INDUSTRIAL CHEMICALS

ACETATE OF LIME
ALUMINA SULPHATE
ALCOHOL (INDUSTRIAL)
AMMONIUM SULPHATE
AMMONIAC SAL
ARSENIC
BLEACH
COPPER SULPHATE
COPPERAS
FORMALDEHYDE
GLAUBERS SALT
POTASH:
Bichromate
Carbonate
Caustic
Chlorate
Prussiate
PHENOL
PHOSPHORUS
SODA:
Ash
Bicarbonate
Bichromate
Caustic
Nitrate
Sulphide

OILS

Crude and Refined Oils in tanks and barrels

COCOANUT
SOYA BEAN
PEANUT
CORN
COTTONSEED
RAPESEED
OLEO
ANIMAL
TALLOW OILS
FISH
RED
NEATSFOOT
PURE LARD
TALLOWS
GREASES
FATTY ACIDS

LUBRICANTS STEARINE SHORTENING

ACIDS PHARMACEUTICALS TANNING EXTRACTS NAVAL STORES
FERTILIZER MATERIALS INTERMEDIATES DYES COLORS

We specialize in the above products for both export and domestic requirements and solicit inquiries from exporters and manufacturers.

Samples and prices furnished promptly upon request. Phone, write or wire at our expense.

GREAT NORTHERN TRADING CO. TELEPHONR BARCLAY 3741 **271 BROADWAY, NEW YORK**

BINNEY & SMITH CO.
BLACKS OF SUPERIORITY

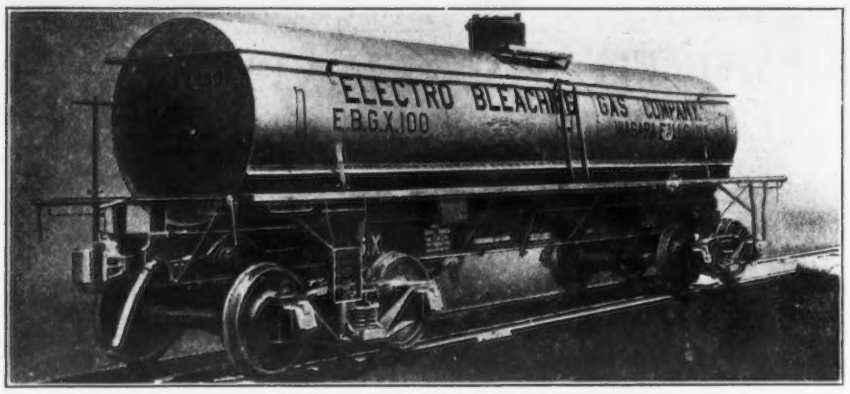
AS USUAL

BLACKS

FOR EVERY PURPOSE

Carbon Black
Bone Black
Drop Black
Ivory Black
Oxide Black
Mineral Black

BINNEY & SMITH CO., 81 Fulton Street, New York



A recent addition to our container equipment which will enlarge the E B G service is a fleet of tank cars.

Shipments can now be made in any quantity from 100 lb. cylinder to a tank car of 30,000 lbs.

ELECTRO BLEACHING GAS CO.

PIONEERS AND LEADING MANUFACTURERS OF LIQUID CHLORINE

Main Offices: 18 EAST 41st STREET, NEW YORK, N. Y.

Chicago Office: 11 S. LA SALLE STREET Plant: NIAGARA FALLS N. Y.

Liquid E B G Chlorine

INDUSTRIAL CHEMICALS

Refined Chemicals for Scientific Purposes

Your attention is especially called to the refined chemicals which this Company is now manufacturing. The following chemicals are the ones which we introduced and had on exhibition at the Sixth National Exposition of Chemical Industries at the Grand Central Palace during the week of September 20:—

Refined Absolute Methyl Alcohol
Refined Acetic Ether
Refined Acetoacetic Ether
Refined Amyl Alcohol
Refined Butyl (Iso) Alcohol
Refined Ethyl Acetate
Refined Ethyl Acetoacetate
Refined Isobutyl Alcohol
Refined Methyl Acetate
Refined Methyl Alcohol
Refined Normal Propyl Alcohol
Refined Propyl Alcohol

We solicit your inquiries for Ethyl Acetate, Amyl Acetate and similar solvents or for refined chemicals as indicated above. Further details, specifications and quotations cheerfully furnished upon request.

U. S. INDUSTRIAL CHEMICAL CO.

Executive Offices: 27 WILLIAM STREET NEW YORK CITY

SEMET-SOLVAY CO.

Manufacture and Sells

Prime Yellow Prussiate of Soda

Electrolytic Caustic Potash
88-92%—70-75% Solid and Liquid

Salicylic Acid
Technical and U. S. P.

Benzaldehyde
U. S. P., Technical, F. F. C.

Benzyl Chloride

Commercial 75% Calcium Chloride
Solid and Granulated

Anhydrous Calcium Chloride

Protective Paints for Iron and Steel
Etc., Etc.

SEMET-SOLVAY CO.
SYRACUSE, N. Y.

522 FIFTH AVENUE
NEW YORK CITY
Tel. Murray Hill 2491

332 So. MICHIGAN AVE.
CHICAGO, ILL.
Tel. Harrison 3580

77 SUMMER STREET
BOSTON, MASS.
Tel. Beach 2379

MICCO

ACETIC ACID
All Grades for Prompt Deliveries

By reason of our large production facilities, we are in a position to offer ACETIC ACID in all grades for immediate or future delivery, thus providing buyers with a steady source of supply. Prompt and careful attention paid to all orders and inquiries.

We also produce ACETATE OF LIME, WOOD ALCOHOL, CHARCOAL and WOOD OILS.

Write or Wire for Prices and Deliveries.

Michigan Iron & Chemical Co.

220 South State Street — Chicago, Ill.

Plants: Boyne City *and* East Jordan, Mich.

Cut Your Cost of Loading!

Speed up the work of loading your carts, trucks and dump cars with a "Brown-Portable" Belt Conveyor! Eliminate your slow-moving, time-wasting shovel gang.

One man with a "B-P" Belt Conveyor can load more bulk chemicals, coal or other loose materials of similar weight and size than a loading gang of four to six men.

He feeds the "B-P" by simply scraping the loose material over the "nose." *There is none of that burdensome lifting to a hopper.*

Write for Bulletin I-206. It contains interesting data on the economical handling of bulk materials. No obligation.

Brown Portable Conveying Machinery Company

10 S. LaSalle Street, Chicago
30 Church Street, New York City

Hydrocarbon Chemical Products Company, Inc.

Lancaster, Pa.

Manufacturers of

Aniline Colors

and

Intermediates

Fuchsine Crystals "OO"
Fuchsine Crystals "O"
Acid Magenta
Cerise
Maroon
Rosaniline
Acid Yellow
Safranine
Spirit Blue
Pure Soluble Blue (Perkins Type)
Pure Soluble Blue (Cascella Type)
Soluble Blue
Alkali Blue
Hyco Bronze Blue 30% paste

DRAPER

Patented June 30, 1908
Patented Jan. 12, 1915
Other Patents Pending

No. 4 Black Steel Barrel

This barrel meets requirements of the
Interstate Commerce Commission
Specification Nos. 5 and 5A

STEEL BARRELS

The Draper Mfg. Co.
CLEVELAND, OHIO
Cable Address: DRAPER, Western Union Code

Eastern Representatives:
C. B. PETERS CO. Inc., 15 Maiden Lane, N. Y.

DMC

DRAPER

No. 1 Black Steel Barrel

Light Shipping Barrel

STEEL BARRELS

The Draper Mfg. Co.
CLEVELAND, OHIO
Cable Address: DRAPER, Western Union Code

Eastern Representatives:
C. B. PETERS CO. Inc., 15 Maiden Lane, N. Y.

DMC